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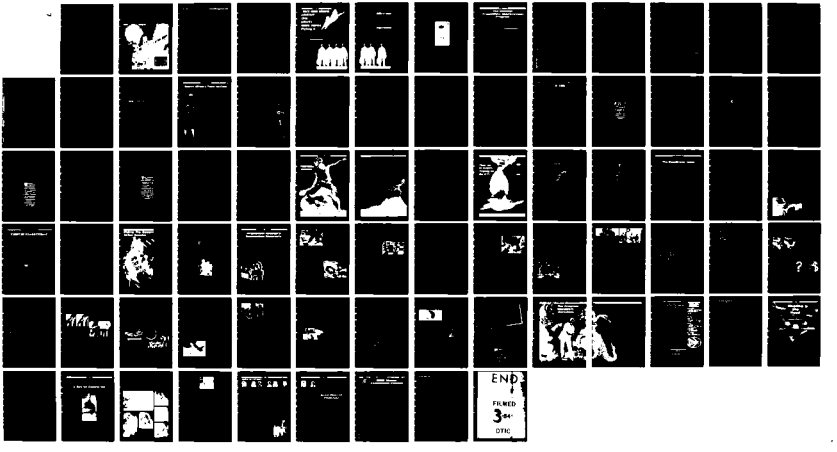

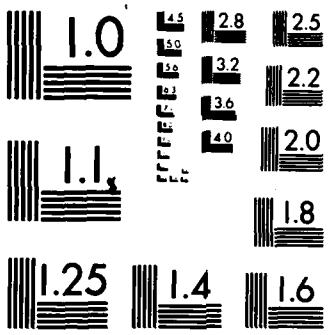

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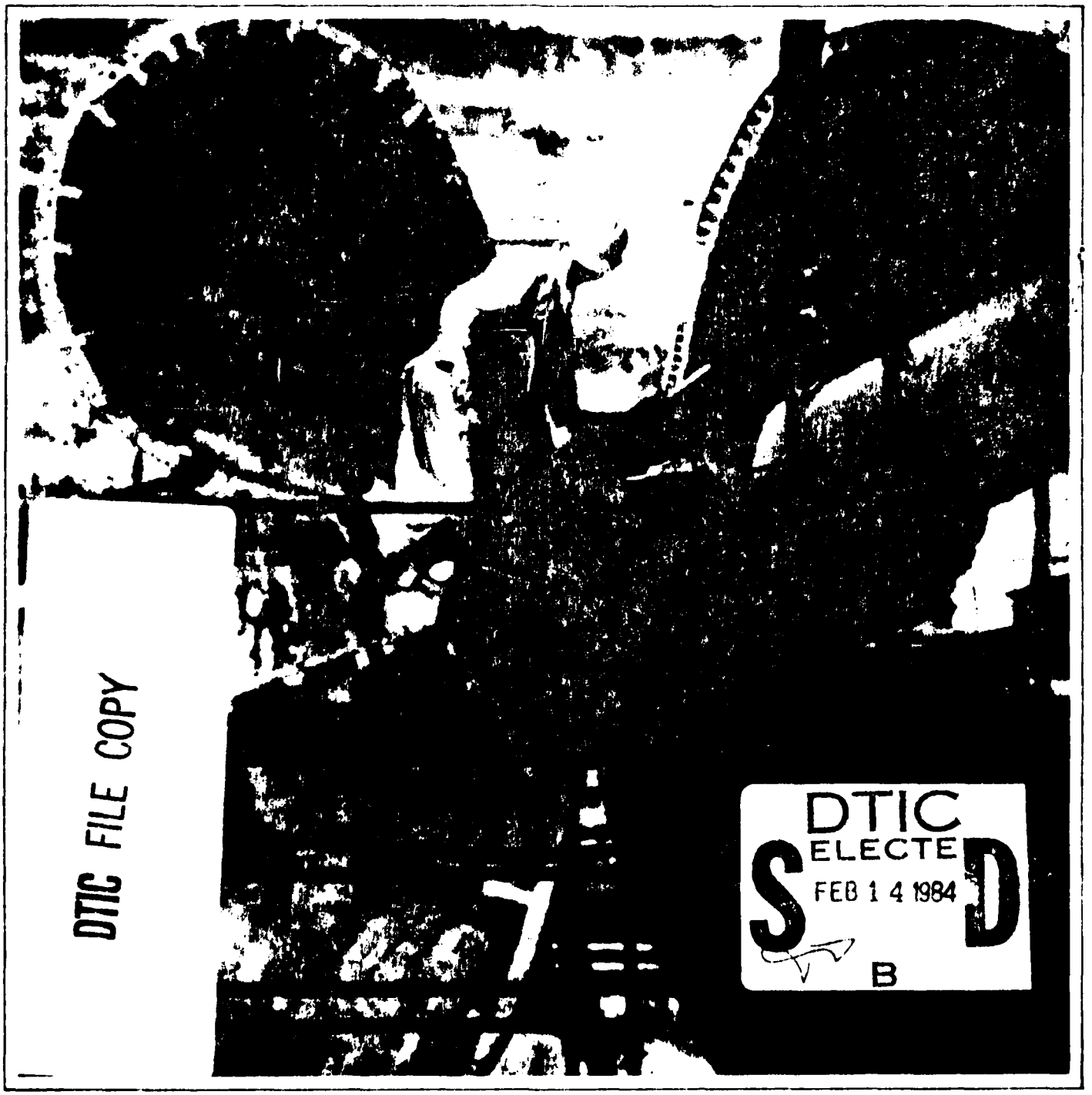

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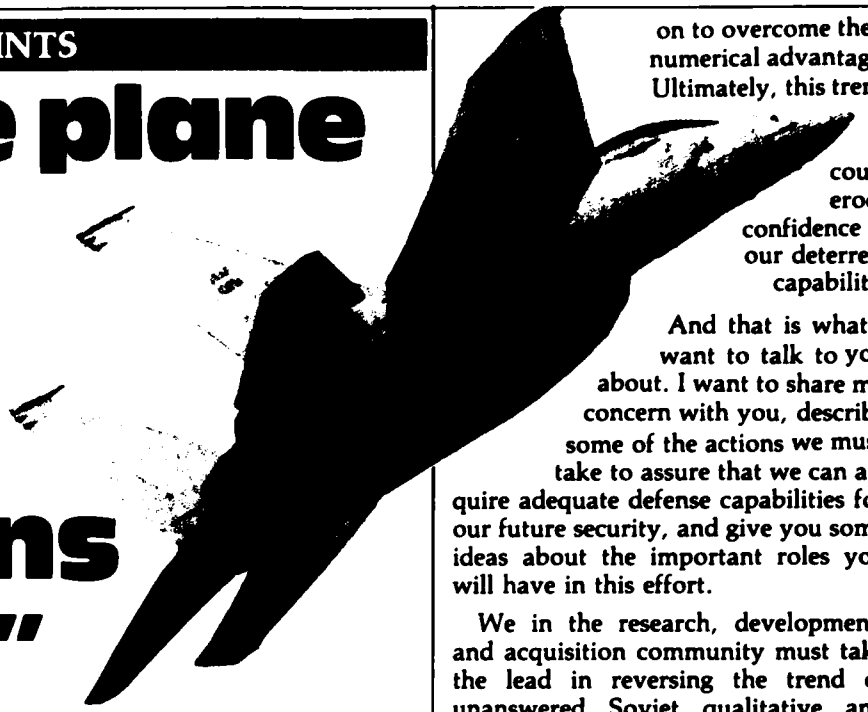
VIEWPOINTS

"Buy one plane and let the pilots take turns flying it."



General Robert T. Marsh, USAF
Commander, Air Force Systems Command

This article is based on remarks made by General Marsh at the DSMC graduation ceremonies for PMC 83-1.

I am concerned about the future. I am concerned because not only do the Soviets still maintain the largest military force in the world, they have made significant advances in the technical sophistication and capability of their forces, and they have dramatically reduced the size of our lead in almost all military-related technologies. For example, the Soviets have reduced our lead in microelectronics and computers—the springboard for so many capabilities—from the 10-12 years we enjoyed a decade ago, to 3-5 years today, or even more disconcerting, the Soviet Union has maintained three to five times our level of effort in directed-energy weapons, laser, particle beams, MIRVs, and look-down-shoot-down technologies. In short, the Soviets are narrowing our lead in technology, a lead that we rely on to overcome their numerical advantage. Ultimately, this trend could erode confidence in our deterrent capability.

And that is what I want to talk to you about. I want to share my concern with you, describe some of the actions we must take to assure that we can acquire adequate defense capabilities for our future security, and give you some ideas about the important roles you will have in this effort.

We in the research, development, and acquisition community must take the lead in reversing the trend of unanswered Soviet qualitative and quantitative achievement that threatens our technical edge. We must strive hard for the capabilities of the future. This is your challenge, and it is more urgent today than ever before.

However, as we are all too well aware, blocking our path is the fact that there is a finite limit to what the country can afford to spend for defense. And, all in this room know that the costs of the increased capabilities demanded by the threat have escalated

dramatically. The fact is that the systems we are fielding today, whether aircraft, ships, tanks, or whatever, cost more than the systems they replaced—significantly more. True, they are also significantly more capable, but the *bottom line* to Congress and the public is *cost*.

It's absolutely essential that we do everything possible to tightly control costs of our new defense capabilities. If we don't, we may find ourselves with such expensive systems that Coolidge's saying, "Buy one plane and let the pilots take turns flying it," may become real.

I wish I could offer you some quick and simple formula for bending this cost curve down. I cannot. But I can offer a simply stated approach: Emphasize the basics. You have spent the last 5 months learning the basics of sound program management. You have heard, and will continue to hear, the leaders of defense acquisition talk about new initiatives and new procedures. But they all boil down to applying the basics of good management in a disciplined way.

The job of all of us in the defense acquisition community is to attend to this business of controlling costs—and to do it now. And that means doing a better job throughout the acquisition process—assuring that we accurately define the design of new weapons, establish sound estimates for their cost, and then bring them in on budget. It's the basics again—nothing more, nothing less.

We found that two basic factors provided the greatest impetus for cost growth: funding shortfalls and program instability.

I can assure you, no one is more concerned over controlling the cost of new acquisitions than we in the Air Force Systems Command (AFSC). In fact, it is our No. 1 priority, and it must be your No. 1 priority too. Let me briefly outline where AFSC is headed.

We recently conducted a study, called the Affordable Acquisition Approach, or A^3, which most of you have heard about. It looked at 109 Air Force programs to identify the causes of cost growth and develop new insights into how we can attack this problem. We found that two basic factors provided the greatest impetus for cost growth: funding shortfalls and program instability.

In responding to funding shortfalls, which resulted from cuts in our total obligation authority, we have historically stretched our programs to live within the budget—which has meant reduced quantity buys, longer programs, and increased unit costs. An example of the result of this practice is the well-known case of the Air Force's F 15, where stretch-out cost us the equivalent of another entire wing of aircraft.

Program instability, the second major cause, results from design, engineering, quantity, schedule, or requirements changes in a program. The effects of instability are much the same—stretch-out and increased unit costs.

The bottom line of all this has been that we have not acquired nearly as much capability for the dollars spent as we should have.

As program cost growth or budget cuts occur, for whatever reason, we must make intelligent decisions about how to accommodate them. We cannot afford the historic practice of simply reducing production rates, or taking money from healthy programs to put into sick programs, thereby weakening the healthy ones.

Further, we have to make the budgeting system more responsive to realistic funding expectations. As you can imagine, this will necessitate some hard decisions by the services and DOD about cancelling sick or unaffordable programs and refusing to start programs we know we can't afford.

To put these lessons into practice, the Air Force Systems Command launched a new effort against cost growth last year. Called project cost, this effort consists of a coordinated, comprehensive attack on cost growth across the entire spectrum of the acquisition process.

It adds new initiatives to those that are already producing results, and affects every aspect of our day-do-day operation. While there isn't time to go into detail on every one of our initiatives—there are hundreds of them—I would like to tell you about several of the most significant ones. Some of this may sound familiar to you. The basics again.

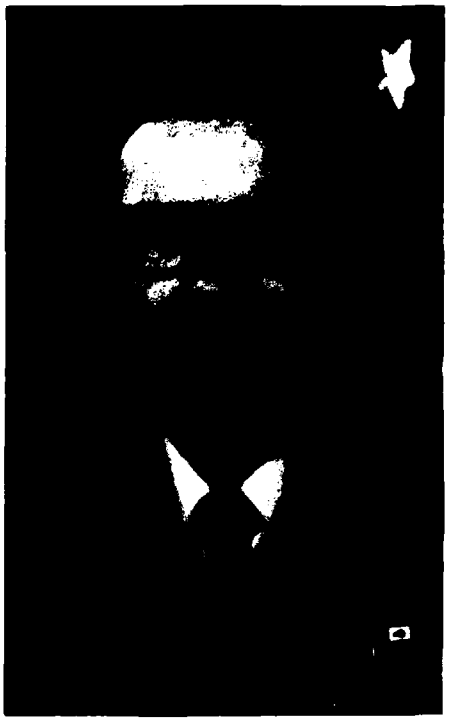
Without a solid early cost estimate as a foundation, you have nothing to hang even the best management practices on later in the program. Thus, this area is receiving a lot of attention under project cost. We already have 21 separate initiatives in this area. One of the prime ones is the increased use of should-cost analysis techniques. These sophisticated procedures will be applied increasingly to selected programs to ensure that our production funding estimates are as accurate as possible. Increased application of should-cost analysis principles is already resulting in large savings and will reduce costs even more in the years to come.

We have other cost-estimating improvements under way, such as cost-estimating research—and learning from what others have already done and finding new and better techniques. Our should-cost techniques, for example, are strongly influenced by the Army's experience. We are going to more thoroughly examine systems cost estimates—whether government or industry—to ensure that they are realistic, comprehensive, and encompass the entire weapon system. We will ensure that no element of performance or support is omitted.

I am sure you spent some time at DSMC discussing the effects that changes in requirements can have on acquisition programs. You know how terribly disruptive they can be. Our concern in this area kicked off another major AFSC initiative—baselining. We have been working hard with every agency involved in our programs—the operator, trainer, maintainer, builder, and tester—to secure early written agreement on the program baselines; that is, requirements, cost, schedule, support, and maintenance concepts. And we have established stringent controls that require high-level approval on changes. As in the B-1B—our first important baseline effort kicked off by the President's need to certify program cost to Congress—changes, ECPs, or whatever, will receive the highest scrutiny. If necessary, something else will be cut to compensate for essential changes.

Baselining has proved to be a tough effort. In fact, my people have been at it for months and we're still not done. It has been a frustrating experience for some. However, I am excited about it. There is great potential here for eliminating cost growth, and I think the difficulty we have experienced in getting everyone to agree to program baselines is simply an indication of how badly we needed this initiative.

Another effort is multiyear procurement, which you have studied thoroughly. We have already instituted multiyear on a number of programs and are estimating about $1.1 billion in savings from them. To date, Congress hasn't supported multiyear as fully as we would like, but we have many additional candidates and we're going to continue to press hard for additional approvals.



Two other project cost initiatives are an effort to reduce program data requirements and our work to reduce the number of cost and schedule control system criteria reviews. In both these cases, there are opportunities for significantly reducing costs, and we have these efforts under way. In fact, we have eliminated a number of data requirements and I encourage you to challenge each and every data requirement you are asked to approve with a critical eye. Data cost lots. We have already reduced C/SCSC reviews to the more informal staff-assistance visit wherever possible. I know you spent a lot of time studying "C-spec," and I don't mean to diminish its importance. But you need to apply it intelligently and tailor it to your needs.

Our productivity and quality enhancement programs will continue to provide cost reduction benefits as well. We recently achieved a great success with one particular contractor by agreeing to a set return on investment for *all* productivity improvements made on *all* contracts—whether as the prime or as a subcontractor. Essentially, we are sharing the savings according to an agreed-upon formula.

The last area I want to mention is that of overhead and compensation, including salaries and wage rates. Here, we are entering an area where, in the case of wages, we are legally constrained and some people believe we have no business. After all, what industry pays its employees is between the company and the employee. We are extremely sensitive to this issue.

However, as you know from your study here, fully 70 percent of our contract costs are direct and indirect labor costs. It is our job—yours and mine—to assure American taxpayers that we are spending their money wisely and receiving the most defense capability possible for every dollar spent. We cannot do that unless we are convinced that we are not paying for salaries that are disproportionately high, when compared to other segments of the economy.

Further, it is essential that the labor and compensation costs of the acquisition programs we manage do not fuel the fires of inflation, and expose us to warranted criticism adversely affecting our ability to carry out the modernization program.

In these areas, we are collecting and studying the data and directing our contracting officers to aggressively pursue fair and reasonable labor costs.

We are also seeking ways to reduce overhead costs. Our goal here is to analyze the overhead cost drivers—things like bonuses, group health insurance, corporate aircraft, and relocation expenses, to name a few—and carefully determine their reasonableness—such as asking that bonuses be directly tied to program benefits. For example, if we are going to allow the bonus to the company's director of quality as a contract cost, then I expect to see a tangible effect in the quality of the product. All of you need to pay attention to the basics you learned at DSMC in this area. Be certain you understand *every* element of cost on your programs.

I've given you a rather quick tour of our project cost efforts—there are dozens more. I know that the other

(continued on page 65)

The Defense Acquisition Improvement Program

Colonel G. Dana Brabson, USAF (Ret.)

Two years ago, many people who had been through prior reforms of the weapon system acquisition process asked, "So, what is different this time?" The difference is the continued commitment of people at all echelons of the Department of Defense (DOD). The fact that the Joint Logistics Commanders (JLC) have chartered an Oversight Committee at the one- and two-star level to review and stimulate implementation by the four services is evidence of this commitment. The JLC report semiannually to the Deputy Secretary of Defense on the status of the program.

Today, there is another question on the minds of people in the acquisition community: "Now that the original architect of the Defense Acquisition Improvement Program (AIP) has left the Department of Defense, will the original thrust be forgotten?" The *primary* objective of this paper is to answer this question. I shall frame the answer in terms of the progress that has been made during the first 2 years and the work that remains to be done. Much of the information I shall present is reflected in the *Second Year-End Report*, forwarded by the Deputy Secretary of Defense on June 8, 1983, under cover of a memorandum entitled "Guidance on the Acquisition Improvement Program (AIP)."[1]

As one reviews the history of the Acquisition Improvement Program, perhaps a half-dozen key dates come to mind.

—March 2, 1981. Mr. Carlucci chartered five working groups to make recommendations on improving the acquisition process.
—March 31, 1981. The working groups provided their recommendations to Mr. Carlucci.
—April 30, 1981. Mr. Carlucci published his 31 decisions.[2]
—July 27, 1981. Mr. Carlucci added the 32nd initiative.[3]
—January 12, 1983. Mr. Thayer took the helm.
—May 5, 1983. Mr. Thayer announced his six "consolidated Acquisition Improvement Program initiatives."[4]

Mr. Thayer's "consolidated initiatives" are actually a composite of 12 of the original initiatives. Table I shows the correlation.

During the course of this paper, I shall pay particular attention to the 12 AIP actions that fit within the framework of Mr. Thayer's consolidated initiatives. I shall also address some of the other actions so that, at the end, you will have a good idea of the progress that has been made to date and of the key themes that are running through the Acquisition Improvement Program. It is important to emphasize that the absence of one of the original 32 actions from Table I in no way denigrates its importance. Rather, the absence of an action from Table I reflects the fact that Mr. Thayer has not selected it for his personal emphasis; the actions missing from Table I can be characterized as "completed" or "on track."

Table I. Consolidated Acquisition Improvement Program Initiatives

Consolidated Initiative	Corresponding AIP Actions
Program Stability	4 Program Stability
Multiyear Procurement	3 Multiyear Procurement
Economic Production Rates	7 Economic Production Rates
Realistic Budgeting	6 Budgeting to Most Likely Cost 11 Budgeting for Technological Risk 18 Budgeting for Inflation
Improved Support and Readiness	9 System Support and Readiness 12 Funding for Test Hardware 16 Contractor Incentives for Support 30 Logistics and Support Resources 31 Improved Reliability and Resources
Encouraging Competition	32 Competition

Controlled Decentralization (Actions 17, 24, 26, 27, 28)

A particularly definitive statement of Mr. Carlucci's intent is provided in his March 27, 1981, memorandum entitled "Management of the DOD Planning, Programming and Budgeting System" (PPBS). In the memorandum, the Deputy Secretary of Defense stated: "We will achieve better

■*Colonel Brabson was Dean, Department of Research and Information, at DSMC prior to his recent retirement from the Air Force. He is an Assistant Professor of Chemistry at Indiana University.*■

Figure 1. "Work Breakdown Structure" for Program Stability

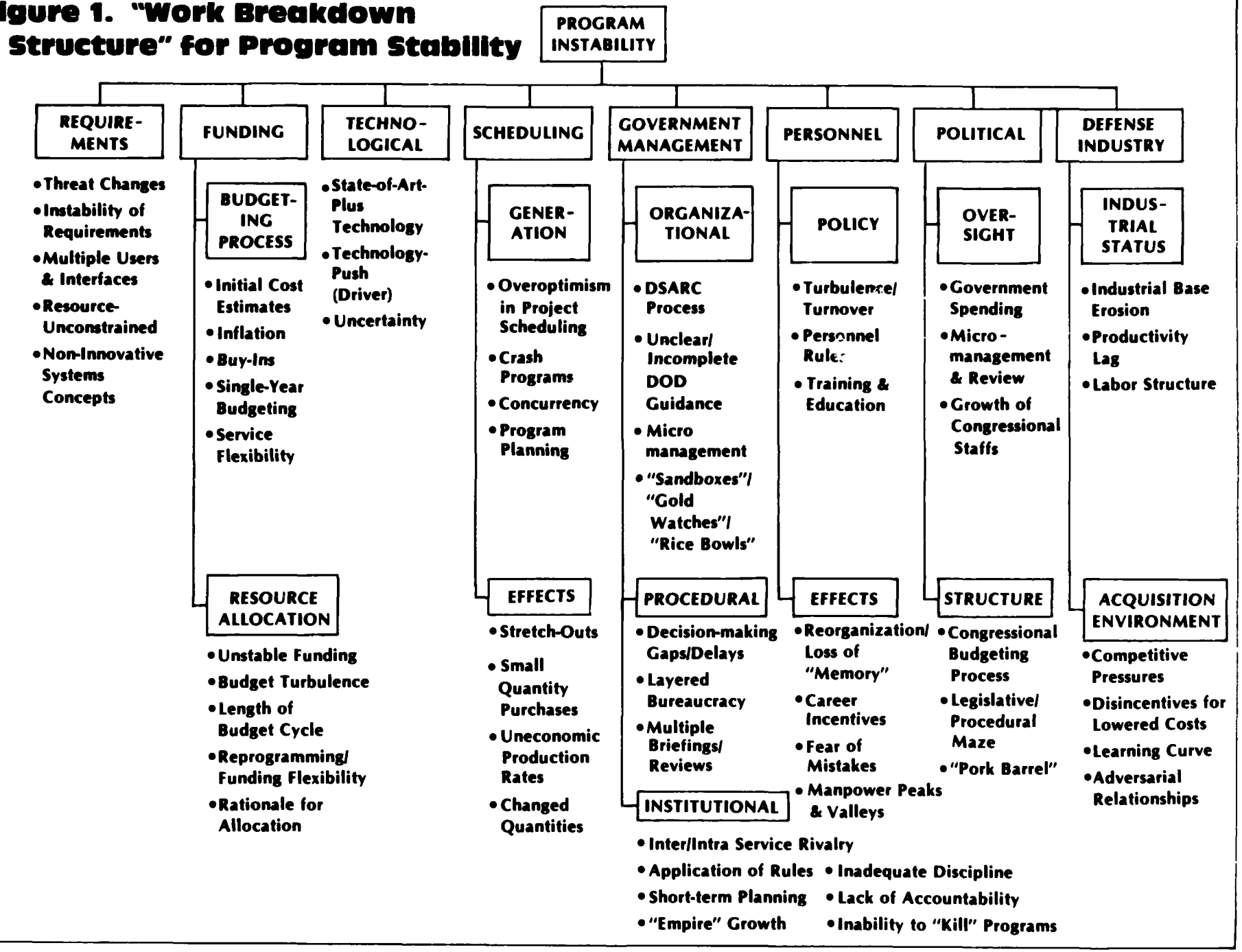
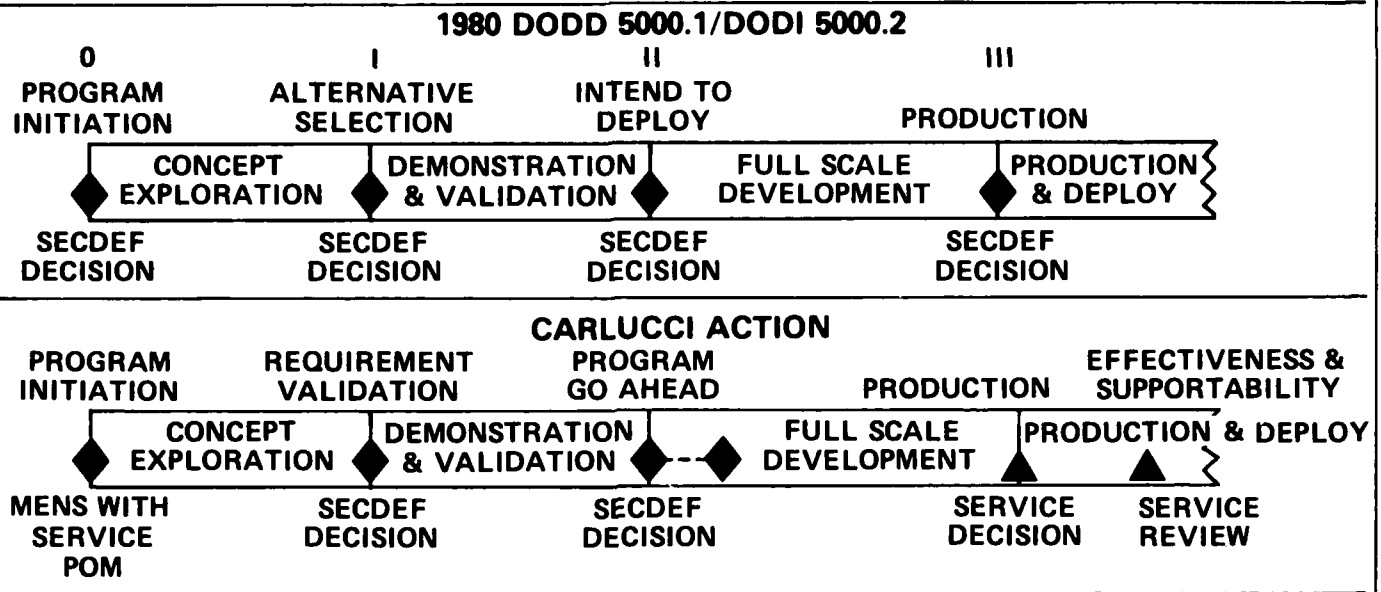


Figure 1. Major Systems Acquisition Process



defense management by working toward a system of centralized control of executive policy direction and more decentralized policy execution."[5] The new policies are contained in the most recent revision of DOD Directive 5000.1, dated March 29, 1982.[6]

The first step was to reduce the number of Defense Systems Acquisition Review Council (DSARC) decisions from four to two, as suggested by Figure 1. Two other features of this figure are also worth noting. First, in a step to provide better integration of the DSARC and PPBS processes, the Justification for Major System New Start (JMSNS), formerly the Mission Element Needs Statement (MENS), is now submitted with the service Program Objective Memorandum (POM) package that provides funds for its execution. Second, the new milestone entitled "program go-ahead" is no longer rigidly tied to the beginning of full-scale development. By opting to delay this milestone, possibly as late as critical design review (CDR), the DSARC can achieve a more accurate view of cost, schedule, performance, industrial base preparedness, supportability, and testing prior to a decision to commit to the completion of full-scale development, production, and deployment.

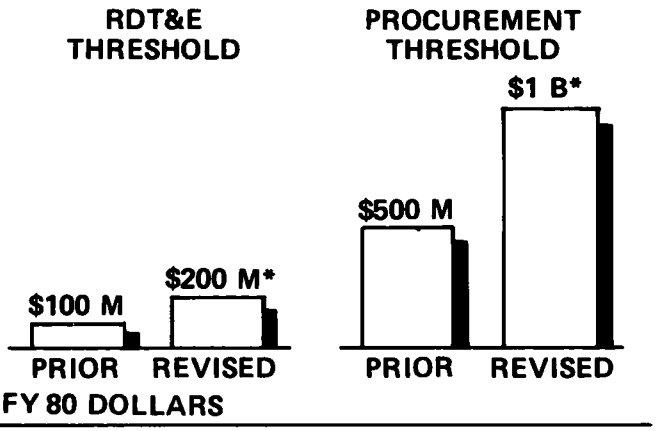
The second step, illustrated by Figure 2, was to double the thresholds which, if breached, require that the program be reviewed by the DSARC. Equally significant is the fact that the services have likewise doubled their review thresholds, thus decentralizing by one level of management a significant number of programs.

The third step was to reduce the number and size of documents required for a DSARC review. This step is graphically portrayed by Figure 3. These new requirements are spelled out in a newly revised DOD Instruction 5000.2, signed March 8, 1983.[7]

Planning and Execution (Actions 2, 3, 4, 6, 7, 8, 11, 15, 18, 19, 20, 22, 25, 29)

It is generally agreed in all sectors that cost growth is a major problem for the Department of Defense and that pro-

Figure 2. DSARC Review Threshold



gram turbulence is a principal contributor to cost growth. Indeed, the President's Private Sector Survey on Cost Control identified program instability as one of the principal contributors to cost growth in DOD acquisition programs.[8] It is not surprising, then, that Mr. Thayer placed program stability at the top of his list of priority defense management initiatives. The dramatic impact of program turbulence is illustrated by the data displayed in Figure 4 for the F-15 program. The left-hand portion of this figure shows that the rate of production of F-15 aircraft has differed from the planned rate annually since 1973. As illustrated by the right-hand portion of this figure, one-half of the 94 percent cost growth reported in the December 31, 1981, Selected Acquisition Report is due to the fact that the Office of Management and Budget (OMB) inflation indices used to estimate program costs underestimate the actual inflation rates. However, another one-fourth of the cost growth is due to the changes in schedule portrayed by the left-hand portion of the figure. The Air Force has estimated this segment of the cost growth at $2 billion (in FY81 dollars). In an effort to

Figure 3. DSARC Information Requirements

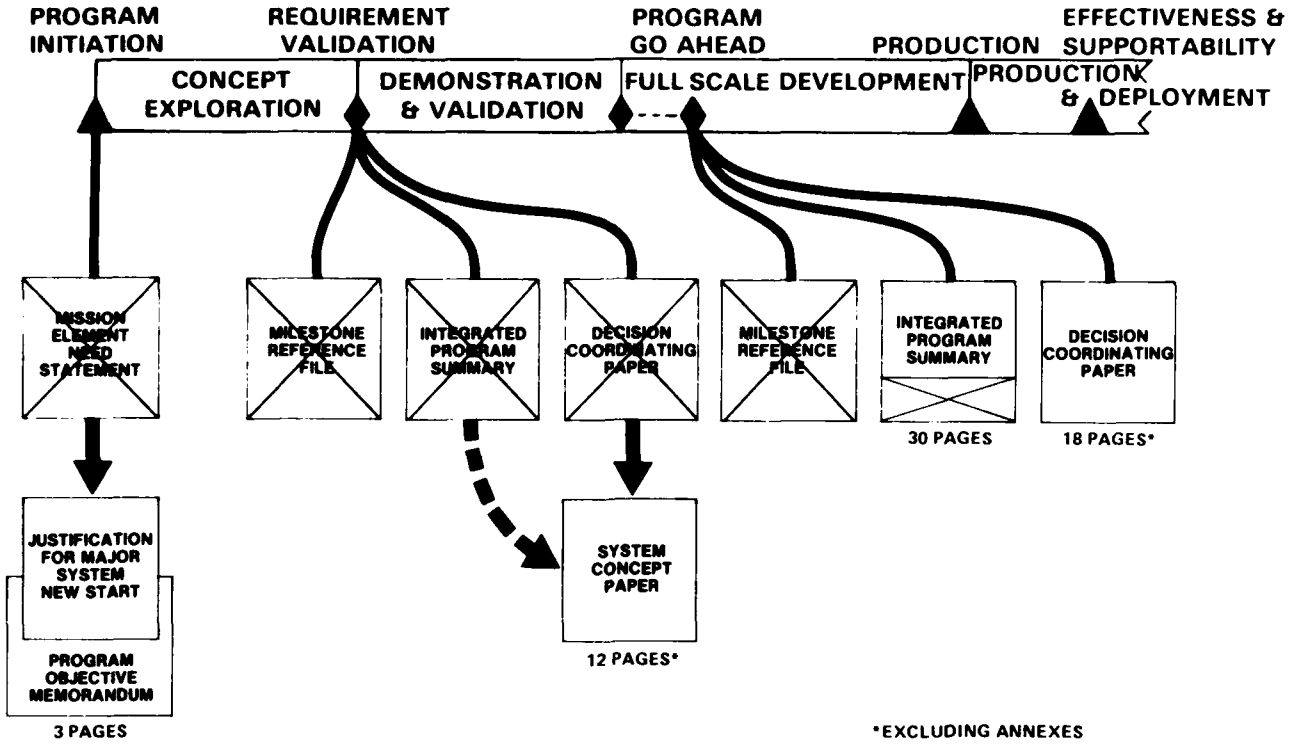


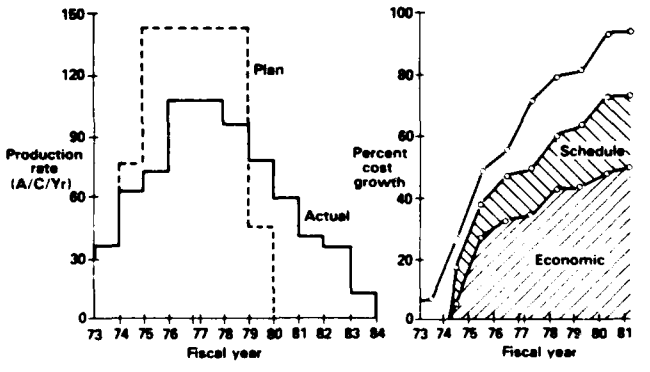
Table II. Stable Programs List: Current and Proposed MYP Programs

Programs	Status	Expected Savings
Eight FY82 Programs F-16 Airframe AN/TRC-170 Radio C-2 Airframe Blackhawk Airframe AN/ALQ-136 Jammer SM-1 Rocket Motor M-1 Fire Control NAVSTAR GPS	Approved	$0.8B
Five FY83 Programs Multiple Launch Rocket System Blackhawk Engine KC-10 NATO Sea Sparrow MK-46 Torpedo	Approved	$1.0B
Six Additional FY83 Programs	In FY84 Budget	$1.5B
Eight FY84 Programs	Proposed	$1.1B

reduce program turbulence, OSD has asked the services to nominate selected programs for a stable programs list. The result is 14 approved multiyear programs; the list now stands at 28 programs.

Multiyear procurement (MYP) has been adopted as the principal tool for stabilizing programs. Figure 5 compares a typical multiyear procurement with an equivalent set of annual procurements. The key provisions of the applicable portion of the FY82 Defense Authorization Bill are suggested by this figure: (1) The maximum length of an MYP contract is 5 years, (2) Congress must be notified if the cancellation liability will exceed $100 million, and (3) the cancellation liability may be used to cover recurring (as well as nonrecurring) expenses. In spite of the inherent flexibility pro-

Figure 4. Program Stability of the F-15 Aircraft



vided in the FY82 bill, significant constraints have been applied to the application of the MYP concept. First, DOD has stated that, as a matter of policy, the cancellation liability must be fully funded up-front. Secondly, the Congress now requires reporting on all programs with cancellation liability greater than $20 million. Third, Congress requires prior notification on *all* economic order quantity (EOQ) purchases. Fourth, Congress has disapproved a significant number of the candidates proposed by the services.

Notwithstanding these limitations, MYP has been pushed vigorously by OSD. Table II gives the current status.

The current Office of the Secretary of Defense (OSD) policy on MYP programs was articulated in a memorandum signed by the Deputy Secretary of Defense on December 29, 1982. The key elements of this policy are quoted below.

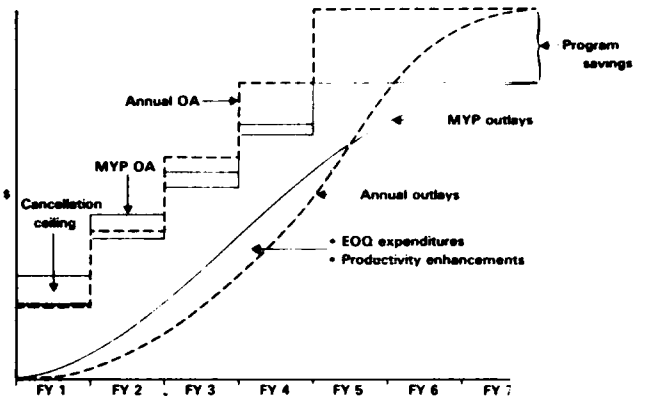
> Maintain our current funding policy for major multiyear procurement programs, but retain, on an exception basis, the flexibility to allow other funding approaches when justified on a case-by-case basis. For smaller programs (those not identified by a separate budget line item), permit the Services to include recurring costs in an unfunded cancellation ceiling when justified on a case-by-case basis.
>
> Clearly articulate in the Fiscal Guidance the OSD commitment to provide up-front TOA for multiyear procurements.
>
> Establish a stable programs list comprised of the programs currently nominated by the Services for multiyear procurement.[9]

The key fact to note here is that, in spite of stated policy limitations regarding full funding of the cancellation liability, OSD will continue in the future to consider exceptions to the policy, as it has in the past. Note that Table II is equivalent to the stable programs list mentioned earlier.

It is important not only to stabilize the rate of manufacture, but also to select a rate at which the fixed costs are distributed over a relatively large number of end items. This fact led to Action 7 dealing with economic production rates. The influence of production rate on unit cost (and hence on total program cost) is illustrated by Figure 6 in which the trend line is based on actual data for a series of aircraft programs. A concerted effort was made in conjunction with the FY83 budget submittal to accelerate programs to a more economic rate. In all, 18 programs were accelerated to rates higher than those proposed in the Carter five-year defense plan; the estimated savings over the lives of these programs now stands at $2.6 billion. Representative examples include the E-3A aircraft, SH-60B LAMPS helicopter, F-16 aircraft, laser Hellfire missile, fighting vehicle systems, and DIVAD gun.[10] Action 7 has been augmented significantly to include institutionalizing Producibility Engineering and Planning (PEP) throughout DOD. PEP must be conducted during FSD to enable accelerating to and then maintaining economic rates.

The fourth area selected by Mr. Thayer is realistic budgeting; under this heading, he grouped three of the AIP actions. The first of these, Action 6, Budgeting to Most Likely Cost, deals with the problem of underestimating the cost of a system, a practice which ultimately leads to apparent cost growth, program stretch-out, and criticism of our management ability. With respect to implementation of this

Figure 5.Multi-Year Procurement



action, emphasis has been placed on obtaining ...pendent cost estimates as the basis for budget submissi... In 1982, OSD selected 10 programs for special review a... ...luation of independent cost estimates. For 1983, the list ... grams has been expanded to 25.

As suggested by the data for the F-15 program (Figure 4), one of the principal sources of apparent cost growth is the difference between the OMB inflation rate we are permitted to use and the inflation rate which characterizes the real world. In an effort to achieve the ability to better plan for anticipated inflation, OSD requested and received permission to use a special set of inflation indices for selected weapon sytem procurements. These indices were published in January of 1982 and revised a year later.[11] The current indices are shown in Table III.

Action 11, Budgeting for Technological Risk, recognized the age-old problem that programs almost always seem to encounter unexpected difficulties and overruns. This characteristic is described schematically by Figure 7. As suggested by this figure, because of the technological uncertainties in the weapon system development business, the probability of coming in on the original cost estimate is almost always sig-

Figure 6. Sensitivity of Fixed-Wing Aircraft Cost to Production Rate

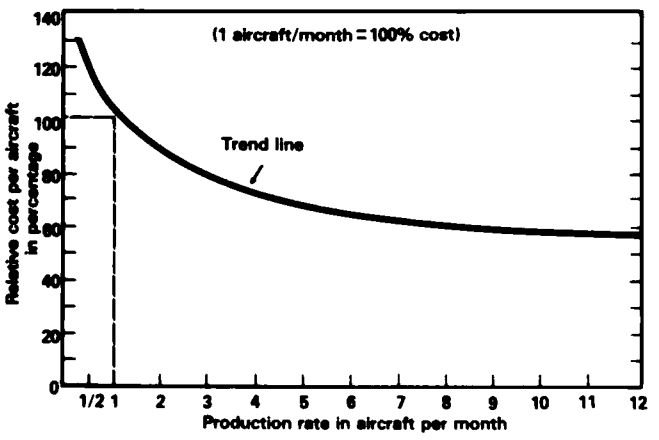


Table III. Special Inflation Indices

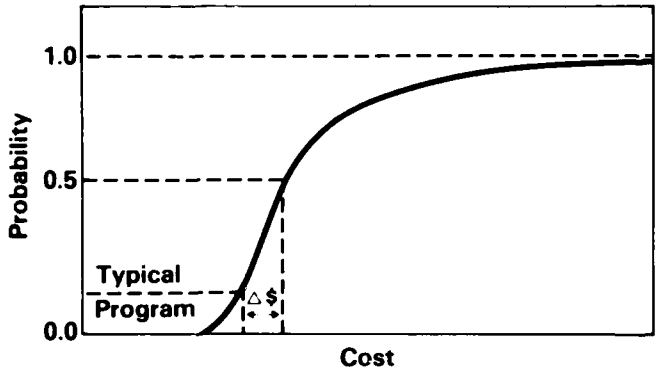
Fiscal Year	Annual Rate for Major Commodities*	Annual Rate for Other Procurements
1982	7.2%	5.5%
1983	6.5	5.0
1984	6.2	4.8
1985	6.0	4.6
1986	5.9	4.5
1987	5.9	4.5
1988	5.8	4.5

*Aircraft: APA, APAF, APN Missiles: MPA, MPAF

Weapons: WTCV, PMC, WPN Ships: SCN

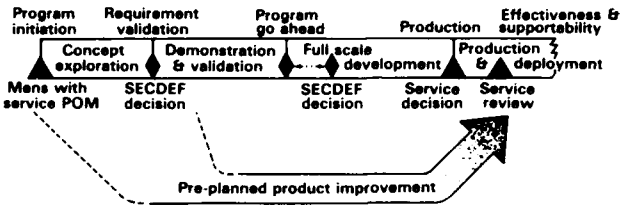
nificantly less than 0.5. The good news is that a variety of techniques, usually computer based, have been devised for quantitatively estimating the delta in dollars that should be set aside as a management reserve to assure a 50:50 (or some other arbitrarily selected) chance of success. The most widely publicized technique is the Army's Total Risk Assessing Cost Estimate (TRACE) program. The Navy and Air Force also estimate and maintain management reserves to cover technological risk for selected major programs.

Figure 7. Cost Risk



One other AIP action deserves mention at this point: Action 2, Pre-Planned Product Improvement (P^3I). It is, of course, our strategy to offset the numerical advantage of our adversaries with technologically superior weaponry. All too often, however, our attempts to insert new technology as fast as possible lead to cost growth and delayed initial operational capabilities (IOCs). The P^3I strategy, illustrated by Figure 8, reduces the technical risk and increases the likelihood of meeting the IOC by fielding the weapon system *without* the ultimate state-of-the-art technology but *with* provisions for incorporating the higher technology at a later date when the technology is more mature. To be effective, P^3I must be an integral part of the acquisition strategy and the following conditions must be satisfied: Planning must begin early in the acquisition cycle, funds must be set aside to develop the higher technology, and the necessary interfaces, electrical power requirements, etc., must be provided so that the improved technology can be inserted easily

Figure 8. Evolutionary Introduction of New Technology



after IOC. In response to the FY83-88 Defense Guidance, the services have identified 26 systems with significant P^3I efforts. For example, an existing engine will be adapted for the initial JVX aircraft; simultaneously, development of a more capable, modern-technology engine will begin. Other examples include the 120mm gun for the M-1 tanks, incorporations of very large integrated-circuit technology (VLSI), the Airborne Self-Protection Jammer (ASPJ), and incorporations of very high-speed integrated circuit technology (VHSIC) in the Joint Tactical Infusion Detection Systems (JTIDS).

Industrial Productivity (Actions 5, 32)

Concern for the industrial base stems both from the shrinking number of contractors who bid on defense contracts and from the aging capital assets of these contractors. The principal OSD thrust in this area is to improve productivity by creating an environment in which improved productivity is stimulated and capital investment is encouraged. A key ingredient in this environment is program stability, and multiyear procurement is an important tool. Given a long-term commitment by the government, the contractor is more willing to make the necessary commitment of resources.

Competition is, of course, a basic cornerstone of the free enterprise system. When applied intelligently, it stimulates development of innovative techniques for improving productivity, improves contractor performance, helps combat rising costs, increases the industrial base, and ensures fairness of opportunity for award of government contracts. Despite this, there is concern that our achievements are not adequate, and the Deputy Secretary of Defense is placing special emphasis on this initiative.

Increased emphasis on competition is far from new. In 1982, goals were established for each of the acquisition commands. Numerous techniques are being used to obtain competition. Examples of recent second-sourcing decisions include the AIM-7M and AMRAAM missile programs. Second sourcing is also introduced at the subcontractor level; current examples include the F-16 canopy, the ACES II ejection seat, the GAU-8 gun, the 30mm ammunition for the GAU-8, and the rocket motors for Pershing II, TOW, Chaparral, and AIM-9M missile programs.

Although Action 5 is not included in Mr. Thayer's list, it is nevertheless of key importance. The objective of Action 5 is described by its title: Encourage Capital Investment to Enhance Productivity. It contains more than a half-dozen specific action items designed to stimulate capital investment and ease cash-flow problems. Some of the specific ac-

tion items have already been accomplished. For example, flexible progress payment procedures have been implemented, increased progress payment rates have been authorized, and the excess-profit provisions of the 1934 Vinson-Trammell Act have been repealed. In addition, the services have been encouraged to place increased emphasis on their manufacturing technology (MANTECH) and technology modernization (TECHMOD) programs. The objective of the MANTECH program is to reduce the material acquisition costs and lead times by providing the manufacturing technology necessary to improve the productivity of the industrial base. The funding projected for the MANTECH program for the next 5 years (FY83–88) is double that for the previous 5 years. It is worth noting in passing that it is entirely appropriate to pursue a MANTECH program in parallel with an RDT&E program. Indeed, this acquisition strategy was adopted in the joint Navy-Air Force AMRAAM program.

The TECHMOD program was initiated to integrate existing manufacturing technologies into modern production facilities. A typical TECHMOD program is a joint government-industry venture in which the government invests in the manufacturing technologies and industry supports the new capital equipment and facilities. The classic example is the F-16 TECHMOD program in which a net savings of $370 million will be shared by the government and General Dynamics.

Readiness (Actions 9, 12, 16, 21, 30, 31)

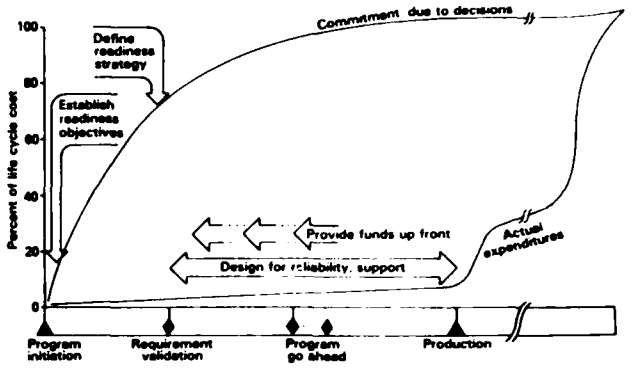
The last group of actions singled out by Mr. Thayer is the group dealing with support and readiness. The current policy is best expressed as follows.

> Improved readiness is a primary objective of the acquisition process, of comparable importance to reduced unit cost or reduced acquisition time. Resources to achieve readiness will receive the same emphasis as those required to achieve schedule or performance objectives.
> —DEPSECDEF Memorandum, April 30, 1981[12]

The principal thrusts of Actions 9 and 31 are illustrated by Figure 9. Two facts are particularly worthy of note in this figure. First, operational and support costs amount to about 60 percent of the total life-cycle cost for a typical weapon system. Second, decisions made very early in the program define the majority of costs that will be incurred during the remainder of the life of the weapon system. In this context, Actions 9 and 31 require that the readiness objectives for the system be defined very early in the program, that the strategy for achieving these objectives be developed by and approved at the requirements-validation milestone, and that adequate funds be provided to assure that reliability and supportability are designed and built into the system. In addition, these actions require an early start of the test-fix-test process, and ask the program manager to examine the feasibility and potential payoff of concurrent development and testing phases for "fast-track" programs.

Actio~ 16, Contractor Incentives for Reliability and Support, addresses the contract and the contractor specifically, and requires that the program management office employ specific contractual incentives focused on designing for reliability and supportability.

Figure 9. Reliability and Supportability



Action 30, Program Manager Control of Logistics and Support Resources, seeks to give the program manager increased visibility of and participation in the supportability decisions affecting his program. In support of this action, PPBS procedures were developed and implemented on a trial basis to identify more clearly the support funds budgeted in 1982 for three programs from each service. The procedures will be applied to an expanded set of programs during the review of the FY85 POM submissions.

The thrust of Action 12, Front End Funding for Test Hardware, is to assure that an adequate number of test articles are provided early in the program. Two objectives are served. First, development and operational testing can be conducted concurrently, thus shortening the program without incurring appreciably greater risks. Second, the iterative test-analyze-fix-test phase and the combined environmental test phase can begin early in the development program, thus facilitating more rapid maturing of the technology, increasing reliability, and reducing supportability and maintainability costs.

As a group, the integrated logistics support actions have been vigorously pursued by OSD. Both DODD 5000.1 and DODI 5000.2 have been revised to increase the priority of support and readiness, and DODD 5000.39 is being revised in the same vein. Implementation of these actions on individual programs is reviewed in the DSARC process. Specific programs in which changes have been made to improve readiness include the ASW Stand Off Weapon, DIVAD gun, AH-64 helicopter, ground-launched cruise missile, LAMPS MK III, ASPJ, Patriot, and M-1 tank.

Administrative Overhead (Actions 10, 13, 14)

The two foci in this area are first to seek revision of selected legislative requirements and second to reduce the burden imposed by DOD directives and instructions. With respect to the first objective, some results have been achieved and some action items are still being pursued. Thus, for example, the 1982 Defense Authorization Act raised the $10,000 limit for purchase order contracts to $25,000, raised the mandatory threshold for contractor certification of cost and pricing data from $100,000 to $500,000, and increased the threshold for service secretarial review of R&D determination and findings (D&Fs) from $100,000 to $5 million. In addition, the 1982 Defense Appropriation Act doubled the reprogramming ceilings both

for RDT&E (from $2 million to $4 million) and for procurement (from $5 million to $10 million). Legislative initiatives still in progress include the following representative examples:

—Amending 13 statutory thresholds to $25,000;

—Amending the Armed Service Procurement Act to authorize negotiation for "second sourcing"; and

—Amending the Walsh-Healey Public Contracts Act and the Contract Work Hours and Safety Standards Act to permit a 4-day, 40-hour week without premium overtime compensation.

With respect to reducing the burden imposed by DOD directives and instructions (and the service regulations that are derived from them), a review group with members from OSD, the services, National Security Industrial Association, and Aerospace Industries Association completed its review of 132 acquisition-related DOD directives and instructions, and recommended that 31 be cancelled. Ten have been deleted thus far. Meanwhile, the emphasis has shifted to an examination of documentation required in DOD contracts. At the request of the Under Secretary of Defense for Research and Engineering (USDRE), the services and industry have conducted in-depth reviews of a small number of systems to identify excessive data and management reporting requirements. The results are being examined by the Defense Systems Management College and recommendations will be made to the USDRE.

Summary

It should be apparent at this point that the Defense Acquisition Improvement Program is alive and well. The Deputy Secretary of Defense has concluded that 22 of the actions are either completed or on track. He has selected six areas for his personal emphasis.

If one takes the entire group of 32 actions as a group, a few key themes can be traced that give insight into the current management philosophy of OSD. Possibly the most important is *program stability*. It is widely recognized that program turbulence is a primary source of cost growth. There are, of course, two dimensions to minimizing program turbulence. At the very highest levels, it is necessary to stabilize the funding levels and production rates. At lower levels, it is necessary to minimize all the actions that contribute to design and schedule changes. Multiyear procurement is viewed as a key tool in the fight to stabilize a core of the programs.

Strong emphasis is also being placed on *realistic budgeting*. The OSD views the challenge as falling jointly on the shoulders of government and industry to increase the realism of budgets and increase the probability of coming in on the budget.

The third theme I would list is emphasis on *reliability and supportability*. As noted earlier, it is desired that integrated logistics support be given the same attention as that given to the achievement of cost, schedule, and performance thresholds and goals.

Competition is perceived as a key tool in the drive to control costs, encourage innovation, and stimulate investment in the industrial base.

Another important theme is the thrust to achieve *economic production rates*. It is, of course, recognized that the achievement of an economic production rate is a key ingredient in the overall affordability of a weapon system. Moreover, the achievement of economic production rates invariably results in the production of more equipment for the field at an earlier date.

Emphasis on *incentives* appears throughout the Acquisition Improvement Program. Included are the traditional contractual incentives such as award fees. Stress is also focused on innovative incentives such as sharing in cost savings. Incentives are suggested to encourage improved productivity and enhanced supportability in addition to the more traditional objectives of meeting cost, schedule, and performance goals.

The seventh theme is *pre-planned product improvment*. The focus is, of course, both on increasing the probability of getting the weapon system in the field on time and on cost, and on providing an opportunity for the development and incorporation of a more advanced technology to meet the evolving threat.

The next theme I would cite is *concurrency*. The need for increased concurrency is evident when one takes note of the rapid development of new technologies. In a recent Army Science Board report on artificial intelligence and robotics, the authors indicate that a technological generation now spans about 4 years. The report goes on to note that, by comparison, a weapon system development program spans 8 to 15 years, or 2 to 4 technological generations. In this environment it is vitally important to introduce concurrency in those circumstances in which the risk can be managed; examples include concurrent development and operational testing and concurrent development and low rate production.

Tailoring of the acquisition process is, of course, closely related to concurrency. *Tailoring* was articulated in OMB Circular A-109,[13] and has never been more appropriate than it is today. If a step in the acquisition process is unnecessary, delete it or combine it with another step. The net result will be more fighting capability in the field at an earlier date.

The last theme is *initiative*, for without *initiative*, particularly on the part of the program manager and his/her key subordinates, the good ideas that can save us money and time will never surface. It is the responsibility of each of us to search for ways to improve the process and be courageous enough to advocate our good ideas.

In conclusion, it is evident that the Defense Acquisition Improvement Program is having a significant impact on the acquisition of weapon systems. Moreover, the Deputy Secretary of Defense has accepted the challenge of adopting the toughest and most important of the initiatives for his personal emphasis. We can expect continued emphasis on this program and continued progress.

As I close, I recall a statement made by Mr. Carlucci during the very early days of the program. It seems equally applicable today.

> It's a large order and you're going to be at the center of it. A lot rides on it, not just your job, not just my job, not just this budget, but indeed the very capability of our country to sustain a defense buildup in the face of a very substantial buildup of the Soviet Union. I think we can do it. I think we can do it because we've got good people. I think we can do it because we've

started out working together. I have confidence in you and I wish you well.[14]■

Notes

1. DEPSECDEF Memorandum, "Guidance on the Acquisition Improvement Program (AIP)," June 8, 1983; and "Acquisition Improvement Program (AIP) Second Year-End Report," May 18, 1983.
2. DEPSECDEF Memorandum, "Improving the Acquisition Process," April 30, 1981.
3. DEPSECDEF Memorandum, "Increasing Competition in the Acquisition Process," July 27, 1981.
4. DEPSECDEF Memorandum, "Priority Defense Management Initiatives," May 5, 1983.
5. DEPSECDEF Memorandum, "Management of the DOD Planning, Programming and Budgeting System," March 27, 1981.
6. DEPSECDEF Memorandum, "DOD Directive 5000.1, 'Major System Acquisitions,' " March 29, 1982; and DOD Directive 5000.1, "Major System Acquisitions," March 29, 1983.
7. DEPSECDEF Memorandum, "Revision of DOD Instruction 5000.2, 'Major System Acquisition Procedures,' " March 8, 1983; and DOD Instruction 5000.2, "Major System Acquisition Procedures," March 8, 1983.
8. The President's Private Sector Survey on Cost Control, Report of the Office of the Secretary of Defense Task Force, July 13, 1983, pp. 198-208.
9. DEPSECDEF Memorandum, "Council on Integrity and Management Improvement Decision on Multiyear Procurement and Program Stability," December 29, 1982.
10. Testimony by the Deputy Secretary of Defense, Frank C. Carlucci, before the House Armed Services Committee on the Department of Defense Authorization for Appropriations for FY 1983, February 9, 1982. The list published in the testimony was subsequently updated; see "DOD Hikes Economic Production Rate Savings Estimate," *Aerospace Daily*, May 27, 1982, p. 149.
11. Assistant Secretary of Defense (Comptroller) Memorandum, "Price Escalation Indices," January 26, 1982, and Principal Deputy Secretary of Defense (Comptroller) Memorandum, "Price Escalation Indices," January 17, 1983.
12. DEPSECDEF Memorandum, "Improving the Acquisition Process," April 30, 1981.
13. OMB Circular A-109, "Major System Acquisitions," April 5, 1976.
14. Frank C. Carlucci, Remarks at the Convocation of Program Management Course 81-2, July 28, 1981.

OMB Circular A-76 Revised

David D. Acker

The Office of Management and Budget (OMB) issued a revision to Circular A-76, "Performance of Commercial Activities," on August 4, 1983. This document replaces the circular issued March 29, 1979. The supplement to the circular has been revised extensively, too.

The revised circular restates the general policy of the government to rely on commercial sources for the supply of products and services when cost effective and feasible. The changes to the circular and supplement are procedural in nature and are intended to clarify and ease the requirements placed on government departments and agencies.

The major changes to the circular include the following:

—When the government is performing an activity in-house that could possibly be done by an outside contractor, a cost study should be performed to determine who can perform the activity by the most cost-effective means. A cost study must be performed if the activity involves more than 10 full-time equivalents. A full-time equivalent is defined as 2,087 employee hours in a fiscal year. Previously, a cost study had to be performed only when the activity was expected to cost over $100,000 annually. By September 30, 1987, all departments and agencies will have to complete cost studies on all applicable activities. New cost studies for the applicable activities will have to be performed at least once every 5 years.

—New activities should be performed by an outside contractor unless there is no satisfactory commercial source available, the activity is vital to national defense, the function is for direct patient care in government hospitals, or commercial costs are unreasonable, and a cost study shows in-house performance is less costly. Previously, the exception criteria did not exist. Further, the departments and agencies were *urged* to perform cost studies under these circumstances, but they were not *required* to do so.

—A cost study must be conducted if an activity is to be expanded or upgraded to a cost that exceeds (1) 30 percent of the total capital investment, or (2) 30 percent of the annual operating costs. The initial edition of the circular required that a cost study be conducted if an activity was expanded or upgraded at a cost that increased the capital investment by $100,000 or 20 percent, or the annual operating costs by $200,000 or 20 percent.

—According to the revised circular, OMB will no longer require departments and agencies to provide an inventory of contracts. Also, less information will be required concerning in-house activities. The revised circular provides for reporting only the name of the activity, the location and description of the activity, and the number of full-time equivalents.

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—The revised circular expands the dollar range for preferential procurement programs. Awards may be made to noncompetitive preferential procurement sources, such as small disadvantaged businesses, without conducting a cost comparison. Also, there is no longer a $100,000 limit for not conducting cost studies.

—Prior to conducting cost studies on in-house activities, an internal management review must be conducted to determine the most efficient and effective means of conducting the in-house operation. Then, the cost study must be performed using the most cost effective in-house operation. The appropriate assistant secretary must certify that this has been done. If the in-house bid wins, the department or agency must implement the most efficient in-house operation within 180 days. Previously, departments and agencies could conduct cost studies without a management review of in-house activities.

—A special tax adjustment is added to the bid and proposal prices of tax-exempt organizations. This is to place these organizations on a more equal level with other contract bidders.

—Other changes to the circular relate to the development of an appeals process within a department or agency, changes in the computation of overhead costs on activities performed in-house, and the development of a standard 2 percent of personnel cost to compute the severance pay portion of conversion costs.■

Heavy Hitters Take on Cost

A Report on the 1983 DOD Acquisition Conference

Commander Benjamin R. Sellers, SC, USN

The 1983 DOD Acquisition Conference, sponsored by the Under Secretary of Defense for Research and Engineering, was held in Hershey, Pa., on September 20, 21, and 22. Rear Admiral Joseph S. Sansone, Jr., SC, USN, and his staff hosted this year's conference, which was attended by more than 300 military and civilian employees of DOD and included representatives from defense industry, the legal community, and congressional staffs.

The 2½-day conference, which began with opening remarks by the Joint Logistics Commanders and concluded with a wrap-up by the service Acquisition Executives and the Deputy Under Secretary of Defense for Research and Engineering (Acquisition Management), was organized into five panels. From these panels, composed of senior government officials and senior industry representatives, emerged the central (although unstated) theme of the conference, which was cost reduction. The underlying issue throughout the conference was, "How can we obtain the products and services we need for national security more efficiently?" The panels addressed the specific topics of competition, program stability, cost control, course for the future, and the industry perspective. In addition, the luncheon and dinner speakers included Ms. Mary Ann Gilleece, Deputy Under Secretary of Defense for Research and Engineering Acquisition Management); Mr. Norman R. Augustine, President, Denver Aerospace Division of Martin Marietta Aerospace; the Honorable David S. C. Chu, Director, Program Analysis and Evaluation for DOD; and the Honorable Paul Thayer, Deputy Secretary of Defense. This agenda provided a unique opportunity for the conference attendees and the panelists to engage in a free exchange of ideas concerning several of the hottest topics in today's dynamic acquisition environment. The purpose of this report is to share with you the current thinking of those who shape our acquisition policy on these difficult and controversial issues that affect us all.

My report summarizes the highlights and major points made by the panelists—insofar as I was able to capture them with pen and paper. It will also address some of the side issues that arose and which tended, at least temporarily, to dominate the discussion. Organizing the report was difficult, because there was a fair amount of overlap in the points made in all of the panels, which is not surprising since they all related to the same central theme—cost reduction. Therefore, I have attempted to avoid redundancy and present, not a chronological, speaker-oriented synopsis, but rather a topic-oriented synthesis of the speakers' comments.

The Joint Logistics Commanders, in their opening remarks, set the stage for all that followed and validated the need for the conference. For example, General James P. Mullins, Commander, Air Force Logistics Command, reminded the audience that free enterprise is the foundation of our nation's economic strength. Many of our current problems result from "meddling with the free enterprise system." In order to be both effective and efficient in meeting our responsibilities as acquisition managers, we must *understand* our industry counterparts and *incentivize* industry to be strong and to produce good, supportable systems. Admiral Steven A. White, Chief of Naval Material, echoed General Mullins' thoughts by declaring that we must improve our business management practices and that we must improve, both in fact and in the image we

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present to the public, our competence as stewards of the taxpayers' funds. Lieutenant General Robert L. Moore, Deputy Commanding General for Research, Development, and Acquisition, U.S. Army Materiel Development and Readiness Command, emphasized that the responsibility of acquisition managers does not end with the successful development of a new system—that system must be successfully transitioned to production and ultimately must be effectively fielded and supported before the job of acquisition management is complete. With the stage set and the mandate for improvement established, the conferees began to address, in earnest, the tough issues on the agenda.

Program Stability

Since all of the panels related to the central theme of cost reduction, it seems appropriate to address the issue of program stability first, because, as was repeatedly emphasized at the conference, without improving the stability of our programs, we cannot hope to achieve cost control, much less cost reduction. In fact, there appears to be a reciprocal relationship between program stability and cost control. That is, one of the best ways to enhance program stability is to control cost growth and one of the best ways to control cost growth is through program stability.

The importance of program stability is stressed in the Air Force's recently completed Affordable Acquisition Approach (A^3) study, as reported to the conferees by Dr. Jacques S. Gansler, Vice President of The Analytic Sciences Corporation. According to Dr. Gansler, the primary causes of program instability are as follows:

—Unrealistic total obligational authority;
—Unrealistic programming;
—Unforecast cost growth;
—Changes in requirements; and
—Lack of industrial labor stability.

These same thoughts were reiterated by Mr. John H. Flaherty, Assistant Deputy Chief of Naval Material (Contracts and Business Management). Dr. Gansler provided the following general recommendations:

—Improve program planning;
—Improve our acquisition practice; and
—Improve our management of the industrial base.

A more specific recommendation for improving program stability, which is currently being implemented on 73 Air Force programs, is the concept of program baselining. According to Mr. James E. Williams, Jr., Deputy Assistant Secretary of the Air Force (Acquisition Management), a program baseline is a comprehensive description of a program in terms of technical performance, schedule, supportability requirements, etc., which is agreed upon by the developer, the user, the logisticians, and the testers. The program baseline is then signed at the general-officer level of the four participating organizations. Nine programs have program baselines agreed to at the four-star level, 64 are signed by the two-star level. In other words, once established, a program baseline will be difficult to change. Mr. Williams indicated that an Air Force regulation on program baselining was projected for completion by the end of October 1983.

Mr. Williams also suggested that NATO participation in a program (e.g., F-16 and AWACS) may lead to a degree of program stability that might otherwise be lacking.

Major General M. Roger Peterson, USAF, Deputy Director, Defense Logistics Agency, pointed out that, while program stability may be attractive from an economic standpoint, it may degrade the technical utility of a system in the face of changing threat; i.e., program stability may lead to technical inflexibility. To combat this, General Peterson suggested the use of preplanned product improvement as an economical solution to the stability/flexibility paradox.

During the question-and-answer period following the program stability panel it was asserted that, while Congress is often portrayed as the "villain" in terms of program stretch-outs, reduced funding, varying annual authorizations, etc., in reality the services themselves actually initiate most of the program stretch-outs and other forms of instability. It was also suggested that, in addition to increasing our commitment to program stability within the services, we need to do a much better job of communicating our acquisition plans to congressional committees and staffs, "selling" them on our plans well in advance of the actual authorization and appropriation hearings.

Cost Control

Brigadier General Raymond C. Preston, Jr., Director of Program Integration, Headquarters, U.S. Air Force, provided the connecting link between program stability and cost control, stating that the key to program stability is cost control. He then identified several specific actions the Air Force is pursuing to enhance cost control and/or cost reduction. Under the Air Force's War on Cost, he discussed the following initiatives:

—Better up-front cost estimates, including independent cost analysis;
—Increased use of should-cost studies;
—Hiring more cost analysts and/or obtaining cost analysis support from independent contractors;
—Increased emphasis on competition and breakout; and
—Increased emphasis on contractor compensation.

General Preston also identified several initiatives under the Acquisition Improvement Program that contribute to cost control, such as:

—Multiyear procurement;
—Budget to most likely cost;
—Efficient production rate; and
—Program stability.

In addition to these initiatives, General Mullins discussed the following Air Force cost-control programs:

—Zero Overpricing Program, which allows a review of prices at any time before the bill is paid and encourages corrective action if overpricing has occurred;
—Pacer Price Program, which gives visibility to, and finds solutions for, unjustified spare parts price increases; and
—Air Force Management Assistance Group special study on spare parts pricing, which is developing more than 160 recommendations for enhancing spare parts procurement.

Admiral White cited the following Navy cost-control initiatives:

—The creation of a new position—the Competition Advocate General;
—An aggressive breakout program;
—Increased emphasis on should cost instead of historical cost; and
—Increased use of DCAS and DCAA assistance.

General Moore stressed:
—Use of off-the-shelf components where possible;
—The need to design in supportability; and
—The importance of good ILS planning and the protection of ILS dollars for their intended use.

A basic message regarding cost control is that regardless of how well we do at controlling cost, if the program began with an overly optimistic cost estimate, the resulting "cost growth" is interpreted as a lack of cost control. This overoptimism hurts the programs individually and seriously damages the FYDP programs collectively.

Brigadier General Benjamin J. Pellegrini, USA, Commandant, Defense Systems Management College, spoke of the importance of Cost/Schedule Control Systems Criteria (C/SCSC) reports in the overall cost-control effort. He said that in order to have effective cost control, a program manager needs to know not only the concepts and terminology of C/SCSC, but also how to read the reports and draw conclusions from them. General Pellegrini provided data showing that past successful program managers considered C/SCSC as an important ingredient in their cost-control efforts.

Mr. Frederick S. Wood, Vice President-Contracts, General Dynamics Corporation, said that DOD has tried many of these initiatives in years past and wondered whether anything has been learned from the experience. In fact, he wondered whether we really understand the problem. He "chastised" the services for each pursuing its own solution to commom problems. He spoke of the value of the Grace Commission Report and how it can help us identify actions that could result in substantial savings over the next few years.

Finally, Mr. Wood coined a phrase that was to become the subject of a recurring debate, and that was that "perception is reality"—at least insofar as the public and congressional perception of our ability to control cost is concerned.

During the question-and-answer session it was pointed out that, with respect to subcontract cost control, competition is being emphasized and the services are increasing their scrutiny of subcontract costs. With respect to compensation reviews, it was stated that 5-percent pay raises for company employees was considered adequate in this period of low inflation. A significant discussion centered on the draft DOD Inspector General's report that gave rise to the recent media blitz on spare-parts prices. It was acknowledged by the DOD IG representative, Mr. Richard D. Lieberman, Assistant Inspector General for Audit Followup, Department of Defense, that the draft report was leaked to the press by an unknown source and that it contained inaccuracies. Mr. Lieberman stated that quality control in the drafting of the reports is being emphasized and that increased dialogue between the inspectors and the activity being inspected, prior to the drafting of the reports, is being encouraged.

Competition

As you might expect, in a conference where the main theme was cost reduction, competition was a recurring topic of discussion. From the very beginning of the conference, when three of the five of the Joint Logistics Commanders referred to the importance of competition, to the wrap-up by the service Acquisition Executives, all of whom stressed their commitment to competition, at least when it makes sense, the pros and cons of competition were constantly being argued. The two strongest indorsements of competition came from Mr. Williams and Mr. Everett Pyatt, Principal Deputy Assistant Secretary of the Navy (Shipbuilding and Logistics). Mr. Williams indicated that the Air Force is strongly committed to increasing competition, to the extent that if errors are made when choosing between a competitive vs. sole-source strategy, we should err in favor of competition, not sole source. Mr. Pyatt emphatically stated that second sourcing is the only effective way to achieve better cost control and/or cost reduction.

Major General Joseph H. Connolly, USAF, Deputy Director Defense Logistics Agency (Acquisition Management) opened the Competition Panel by saying that pressure for competition is coming from all directions, as evidenced by the following:
—President Reagan's memo of August 11, 1983;
—Secretary Weinberger's memo of September 29, 1982;
—Deputy Secretary Thayer's initiatives under the Acquisition Improvement Program;
—Executive Order 12352 of March 17, 1982;
—Senate Bill S-338;
—House Bill H.R. 2545; and
—Public Law 98-72.

In response to Executive Order 12352, General Connolly mentioned the work of Task Group No. 3 and their draft criteria for enhanced competition, which is currently being reviewed. He also mentioned that our current emphasis on competition runs counter to an apparent trend in the private sector, where companies are lessening competition in their pur-

chases and are establishing more sole-source, long-term relationships with their suppliers.

Admiral Sansone declared that efforts to increase competition is an "all hands" responsibility. He emphasized the need to pursue competition only when it makes sense to do so. This thought was echoed by many of the other speakers, including Dr. Jay R. Sculley, Assistant Secretary of the Army (Research, Development, and Acquisition) and Ms. Gilleece. Admiral Sansone also reinforced a comment made by Lieutenant General H. A. Hatch, Deputy Chief of Staff (Installations and Logistics), Headquarters, U.S. Marine Corps, that we must plan for production competition early in the acquisition cycle; otherwise, we'll be stuck with a sole source for the life of the program. Admiral Sansone identified the following current actions by the Navy:

—Establishment of Competition Advocates in major buying activities, including both technical and business specialists;

—Establishment of realistic competition goals, including consideration of the resources required to support competition;

—Improved reporting of achievements to improve our image and to share our techniques;

—Up-front planning in acquisition strategies;

—Emphasing the responsibility of the systems commands commanders for enhancing competition; and

—Initiation of legislation for negotiation authority for the purpose of dual sourcing ("Exception 18").

Mr. Ira L. Kemp, Associate Director of Contracting and Manufacturing Policy, Deputy Chief of Staff, U.S. Air Force (Research, Development, and Acquisition), spoke of the importance of component breakout, whether for competition or not, and the use of DAR Supplement No. 6 in making item-by-item breakout decisions.

With regard to subcontract competition, Mr. George E. Dausman, Deputy Assistant Secretary of the Army (Acquisition), mentioned an Army Procurement Research Office study, APRO 82-11, dated November 1982. He said we can make improvements in subcontract competition by doing the following:

—Improving our management of the subcontracting process;

—Emphasizing competition in our Contractor Purchasing System Reviews;

—Emphasizing subcontract competition in our source-selection criteria; and

—Using award fees and other contract incentives.

In the midst of all the enthusiasm and optimism regarding competition, an emphatic counterpoint was offered by Mr. John A. O'Hara, Vice President-Contracts of The Boeing Company. He said that competition is not the answer to all our problems. He reminded us that there are five other initiatives under Executive Order 12352 that also deserve priority attention. He stressed that we must look at all the potential negative impacts of competition before embarking on such a strategy.

Course for the Future

Mr. Dale R. Babione, Director of Government Business Relations for The Boeing Company, presented a detailed overview of the findings and recommendations of the President's Private Sector Survey on Cost Control (better known as the Grace Commission). While he acknowledged that the estimated savings may be suspect, he presented many of the Commission's recommendations, which in total might save DOD $107 billion over the next 3 years, of which $77 billion is related to procurement. Some of the recommendations, in order of savings potential:

Action	Potential Savings
Increase program stability	18B
Use common components and subassemblies	7.0B
Multiyear procurement	6.5B
Improve inventory management	6.0B
Increase emphasis on productivity/producibility	5.0B
Use economic order quantities	4.5B
Repeal Service Contract Act/Davis-Bacon Act	3.5B
Increase use of dual sourcing	3.4B
Improve program planning	2.9B
Improve cost estimating	2.9B

Mr. Donald Sowle, Administrator, Office of Federal Procurement Policy, reminded us of the size of the procurement business in the federal government. He said that in FY 84, government procurement people will spend approximately $180 billion, which is 20 percent of the federal budget and *50 percent* of what's left over after entitlements are paid! He spoke of OFPP's efforts to devise a new procurement system and management system for procurement, as required by Executive Order 12352. Many of the OFPP recommendations contained in their "Proposal for a Uniform Federal Procurement System" are currently being implemented without requiring legislative action. The most visible of the changes is the implementation of the Federal Acquisition Regulation (which replaces the DAR, the FPR, and the NASA PR) on April 1, 1984. In addition, he mentioned the excellent work that has been accomplished by the six interagency working groups to develop methods of implementing the direction contained in Executive Order 12352. Implementaion of these recommendations should lead to improvements in the near term. The six areas of emphasis in Executive Order 12352 are as follows:

—The designation of agency procurement executives and the creation of a common charter for them;

—The establishment of clear lines of responsibility, authority, and accountability for procurement professionals;

—Increasing competition and the creation of criteria for the use of competition;

—Reduction of administrative cost and burden in the procurement process;

—Simplification of small purchase procedures; and

—Improved career management system for procurement professionals.

Industry Perspective

One of the potentially most valuable aspects of the conference was the fact that it was so well attended by senior industry representatives. Not only were there industry members on each panel, but the final panel was made up solely of industry personnel. This feature of the conference provided assurance that the impact of our initiatives on industry could be aired. The industry representatives were quite candid, in some cases almost cutting, in their remarks, and their message was clear: In order for our policies and initiatives to be successful and effective in the long run, we must assess the long-run effect that they will have on our industry counterparts. In

this regard, it might be said that the conference represented a microcosm of the current government-industry relationship in general—outwardly cooperative, but with a strong undercurrent of adversarial distrust.

I would like to step out of the reporter's role for just a moment to suggest that this issue—the government-industry relationship—may be the most important issue we face in our quest to procure useful, supportable equipment at economical prices. Why is this issue so important? Simply because an endeavor such as the design, development, and production of a major weapon system entails a medium-to-long-term "partnership" between government and industry that is fraught with risk and uncertainty for both partners. We can expect that industry will aggressively protect its own long-term best interest. We would do the same if we were in industry's shoes. Indeed, such a strategy is the only viable strategy for the long-term health of our industrial base, which is essential for our national security of tomorrow.

If we accept this "fact of life," then it behooves us to formulate policy that will result in a long-term "win-win" outcome. For, surely, in this multibillion dollar business of major systems acquisition, there is no such thing as a long-term "win-lose" outcome. For example, if our policies create a long-term losing situation for industry, industry will react by withdrawing from defense business, by producing inferior products, by declaring bankruptcy, or by requiring government bail-outs—all of which are long-term losses for the government. Similarly, if industry wins and the government loses over the long term, the results are increased regulation, micromanagement, renegotiation boards, and possibly weakened national defense and/or national economic strife. Therefore, there are only two possible long-term outcomes, "win-win" and "lose-lose."

Deputy Secretary Thayer certainly recognizes the need for a true commitment by both government and industry to improve our teamwork. Government must treat industry fairly, and industry must build high-quality systems at economical prices. In Deputy Secretary Thayer's words, despite an arms-length relationship, "We must meet our challenges as a team—a well-run military-industrial complex." For, he explained, "When the horror stories appear in the press, the defense budget suffers." Several other speakers besides the industry representatives, including Ms. Gilleece and General Mullins, made similar comments.

The industry speakers attempted, through their comments, to hold up a mirror to show the government representatives the errors of some of our current actions and initiatives, as seen from their perspective. Their list of "errors" was disquietingly long and included the following:
—Accepting unsupported allegations in the press as fact and then overreacting to them—even when the government knows the charges are false;
—Unwillingness to accept the judgment of government contracting officers and even the ASBCA without review after review of their decisions;
—Punishments that dwarf the "crime," i.e., suspension or debarment for relatively minor offenses;
—Indiscriminate use of unauthorized contract clauses;
—Micromanagement;
—Compensation guidelines and reviews;
—Unilateral DAR changes (i.e., disallowance of lobbying costs/discontinuance of CWAS);
—Congressional ceiling/reduction of IR&D and B&P;
—Proposal to reduce progress payments; and
—Potential over-reliance on competition.

Mr. Richard G. Mulligan, Vice President, TRW, summed it up by saying that the environment surrounding the government-industry relationship is as bad now as he has ever seen it.

From industry's viewpoint, what needs to be done?
—Contractors can try to "clean up" their own houses where they have problems;
—We can all toot our own horns to the public regarding our successes;
—Correct the errors in the press/stand up and defend the truth;
—Don't unduly restrict compensation rewards;
—Improve our profit policy;
—Support the Industrial Modernization and Incentive Program (IMIP);
—Revise DODD 7640.2 in response to audit reports;
—Get rid of unsanctioned contract clauses;
—Stop micromanaging;
—Retain a sense of perspective regarding offenses and punishments; and
—Protect the authority of our institutions, such as contracting officers and ASBCA.

The Honorable Paul Thayer, Deputy Secretary of Defense

In addition to Deputy Secretary Thayer's comments cited earlier, he provided additional guidance for us all during his dinner speech on September 21. He emphasized the significance of the procurement reforms now under way. He reminded us that even though we may run into some alligators along the way, we must work together and persevere in our effort to "drain the swamp." The Deputy Secretary reiterated his personal interest in the following six issues of the Acquisition Improvement Program:
—Program Stability;
—Multiyear Procurement;
—Economic Production Rates;
—Realistic Budgeting;
—Improved Readiness and Support; and
—Increased Competition.

He also stressed the importance of providing assistance to small and disadvantaged business as well as the importance of ensuring a smooth transition to the Federal Acquisition Regulation.

Chu's Shibboleths

You've probably heard of Augustine's Laws, but are you ready for Chu's Shibboleths? According to Webster, a shibboleth is, among other things, a commonplace saying or idea. According to Dr. David S. C. Chu, Director of Program Analysis and Evaluation (PA&E) for the Department of Defense, there are several commonplace ideas being espoused in the acquisition community that are not necessarily true, at least not in all cases.

As a luncheon speaker at the conference, Dr. Chu presented five shibboleths and his responses to them.

1. Defense procurement inequitably benefits the sun-belt states.

Response: This is not necessarily true, especially when the subcontracts that result from DOD prime contracts are considered. PA&E has developed an economic model called DEIMS (Defense Economic Impact Modeling System), which shows a *relatively* equitable geographic distribution of

the dollars resulting from defense contracts and subcontracts.

2. Dual sourcing is always good.

Response: Dual sourcing is beneficial only if the production quantities are large enough to offset the cost of establishing and qualifying the second source. A "cost" of dual sourcing which is easily overlooked is the increase in cost resulting from lower production rates.

3. Always buy at the most efficient production rate.

Response: The following situations argue against buying at the most efficient rate: (a) when the system is not yet ready for full-rate production (e.g., the IIR Maverick); (b) when the system cannot be used until another system is ready (e.g., LAMPS MK III); and (c) when a "warm" production base is needed over a long period (e.g., some aircraft production).

4. Joint-service programs are good and are economical.

Response: Frequently, shotgun marriages don't work! As an alternative, one service can develop the system and the other service(s) can become customer(s) of the developing service (e.g., Black Hawk/LAMPS helicopter).

5. More exhaustive testing is needed before production begins.

Response: Exhaustive testing is prohibitive for systems with long production lead times (e.g., spacecraft and ships).

Finally, regarding recent changes in cost estimating, which should lead to more realistic budgeting for major DOD systems, Dr. Chu informed the audience that: (a) OSD has been successful in divorcing some systems from the requirement to use OMB inflation projections; and (b) major systems must develop both a program office cost estimate and an independent cost estimate. The service may use either estimate for budgeting, but it must justify whichever estimate it uses, especially if it is the lower one.

Conference Wrap-Up

The service Acquisition Executives provided some real words of wisdom for the conferees to take with them as we return to our day-to-day jobs. Dr. Sculley provided a good overview of why the solutions to some of our problems seem so elusive. "We live in an environment of change," he said, such as:

—Changes in the threat;
—Economic change;
—Technical, state-of-the-art changes;
—Political change;
—Changes in military guidance; and
—Changes in military tactics.

In the face of all of these changes, it is no wonder that program stability, which is the most fundamental issue in our cost control/cost reduction efforts, is extremely difficult to achieve. In addition, Dr. Sculley cautioned us against pursuing too many initiatives simultaneously, as well as against blindly implementing any of them without due consideration for their overall program impact. Finally, Dr. Sculley exhorted us to ensure that we provide reliable, effective equipment to the troops in the field while obtaining full value for our procurement dollar.

Mr. Pyatt said that everything we do must pass the "common-sense" test in order to be effective. He reminded us that preservation of the public trust, accountability, and cost consciousness are as fundamental to our jobs as blocking and tackling are in football. In addition, he forewarned us that more punishments to our people are coming when the situation demands it. In conclusion, he said that we must demand the very best of ourselves and our people.

Mr. Williams, in addition to his comments cited earlier, spoke of the benefits to be gained from the increased use of warranties and of Air Force Secretary Verne Orr's personal initiative concerning reprocurement data rights. In his wrap-up, he also suggested potential action items, as he saw them, resulting from the conference:
—Provide for pre- and post-audit briefings by the IG to management;
—Conduct a survey of contractors relative to the impact and usefulness of DOD Directive 7640.2 on contract audit follow-up

—Institutionalize program baselining before program go-ahead (Milestone II)
—Increase the use of multiyear procurement;
—Better publicize for our accomplishments, particularly in the spare-parts area;
—Provide additional personnel resources to support competition and breakout;
—Obtain OSD support on limitation of proprietary rights;
—Provide consistent reporting on competition including subcontracts:
—Conduct a re-review of profit policy—perhaps along the lines of the Air Force Profit '82 study;
—Publish and respond to the truth (not to false allegations); and
—Be proud of the job we are doing in the acquisition business and do our jobs professionally.

As the conference sponsor, Ms. Gilleece provided what I considered to be an outstanding wrap-up and gave some excellent guidance to the attendees. First, she indicated that the conference had received very strong support from both Secretary Weinberger and Deputy Secretary Thayer. The following points represent her position on the major issues addressed during the 2½ days.
—Program Stability: It is *essential* for cost control/cost reduction; however, it does inhibit flexibility and, realistically, it will be difficult to achieve in the near term.
—Competition: Use competition when it makes sense. Reporting of competition statistics must be clarified. S-338 and H.R. 2545 may not be enacted during this session of Congress.
—Progress Payments: DOD supports the current progress-payments procedures and limitations.
—DODD 7640.2 Contract Audit Follow-up: May need to be revised or withdrawn.
—CAS and Profit Policy: will be studied.
—Contracts: Need to look at specifications and clauses.
—FAR: Is on course, training has been scheduled, and smooth implementation is expected.
—Spare Parts: We must continue to work on this.
—Industry concerns: She agrees with most of the comments made by the industry representatives. She, too, is against micromanagement and believes we need to better educate Congress on industry issues such as IR&D, progress payments, etc. She said, however, that DOD cannot implement the necessary changes alone; we will need the commitment of industry to improve the situation. She emphasized that we do not operate in a vacuum; we need better communication and understanding among Congress, industry, DOD, and the Inspector General staff. In conclusion, Ms. Gilleece said that "We can do better—don't hide it—talk about it, do it, and publicize it!" ■

A-109:

A Synthesis of Concerns and Interpretations Expressed in the Literature

Dr. Gordon A. Smith

Much of the emotion that OMB Circular A-109 generated after it was issued in April 1976 has subsided, and its major system acquisition policies are intact. In view of this, it seems appropriate to examine studies and writings in the field to show how the intent of A-109 has been perceived and interpreted by the acquisition community. The purpose of this paper, therefore, is to synthesize the opinions and findings expressed and presented in the acquisition literature, particularly as they apply to major Department of Defense (DOD) systems.

A Review of Literature That Discusses A-109 in General Terms

In reviewing the published literature concerning A-109 and the implementation of its policies, it is apparent that very little of a substantive nature has been written. Most of the publications describe the acquisition process and are interpretive and conjectural. One paper that discusses the underlying philosophy of A-109 was prepared by the Office of Federal Procurement Policy's Associate Administrator for Major Systems Acquisitions and Procurement Strategies.[1] This paper demonstrates how A-109 links classical problem-solving logic with established management and business principles. As expressed before a congressional committee, a major system acquisition program requires only a few basic steps:

1. The problem must be identified, defined, and the objectives for the program set.
2. Alternative ways to solve the problem must be identified and explored.
3. A test and evaluation process must be applied so that a choice may be made among the alternatives.
4. Finally, the chosen alternative must be implemented.[2]

In following this procedure, we are told that it is a simple matter to apply good management practices by placing someone in charge of the program (the program manager), developing a program plan (the acquisition strategy), and selecting a system that satisfies the needs of the program's mission. In implementing this management approach, sound business principles are advocated and take the form of funding competitive programs to determine the best solution. This systematic interlocking of logic with basic management and business philosophies is seen by the Office of Federal Procurement Policy (OFPP) as A-109's fundamental tenet, and is considered a prerequisite for achieving a viable system acquisition process.

In spite of the apparent logic of A-109, it is perhaps presumptuous to believe that its policies will improve the major system acquisition process. Typically, when faced with problems in society, the solution is "to develop a corrective 'tool' and institutionalize it, thereby creating the expectation that we have eliminated the problem forever, by process control."[3] This is a potential trap for A-109, the intent of which is to provide a framework for controlling one of the most complex processes the government bureaucracy has to deal with.

One model[4] that illustrates the complexity of the major system acquisition process describes the process as: demanding, as measured by the rapid rate of technological change; unstructured, as indicated by the length of acquisition cycle, size of order, and discontinuity of funding; unstable, particularly when risk is equally shared by buyer and seller; and ineffective, when the transaction process is dominated by one party and by the formalization of the communication mechanisms. Viewed in this light, the DOD process for acquiring major weapon systems would appear to have little chance of becoming stable and effective, with or without the benefit of A-109.

Risk Management

High risk is one of the complicating characteristics in the acquisition process, and there is a natural tendency to try to reduce it. Sharing the risk among participants in a process appears to be an obvious ploy to achieve this; however, this does not reduce risk—it only spreads it, as in the case of funding competitive contracts to study alternative solutions. Furthermore, Melcher *et al.* hypothesize that the more equally the risk is shared, the greater the instability of the process.[5]

Another suggestion for reducing risk is to stay with known technology. If this tactic is employed, the risk of a program cost overrun is probably reduced. A corollary to this is that a program with severe budget constraints will seldom introduce new technology.[6] Either way, a program manager is usually under pressure to stay with known technology. This posture is even more understandable when one considers the stinging criticism that DOD has been subjected to for "gold-plating." In fact, positive action was taken to alleviate this practice as early as 1977. DOD Directive 5000.1, dated January 18, 1977, made clear that "every effort shall be made to prevent the expenditure of resources to achieve

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unnecessary performance and schedule requirements."[7] When DOD Instruction 5000.2 was revised and reissued in March 1980, the wording was different but the message was the same; and one of the principles in the current 5000.1 states that "a cost-effective balance must be achieved among acquisition cost, ownership costs of major systems, and system effectiveness in terms of the mission to be performed."[8]

Yet another way to reduce risk is to delay development of subsystems until the overall system concepts have been evaluated. This alleviates the possibility of channeling funds into the design of components that may never be used. The dangers in this approach are twofold. A subsystem may not be available when the time comes for demonstrating the overall system, and unforeseen problems with the subsystem design may require heavy expenditures late in the acquisition cycle. Circular A-109 recognizes the dilemma associated with the timing of subsystem development:

> Development of subsystems that are intended to be included in a major system acquisition program will be restricted to less than fully designed hardware (full-scale development) until the subsystem is identified as part of a system candidate for full-scale development. Exceptions may be authorized by the agency head if the subsystems are long lead items that fulfill a recognized generic need or if they have a high potential for common use among several existing or future systems.[9]

As a further hedge against subsystem problems, it has been suggested that DOD make resources available to support needed development of materials, devices, and components, as well as subsystems and systems.[10] Again, A-109 makes provision for these types of development by stating that applied technology efforts oriented to system developments should be performed in response to approved mission needs.[11]

Notwithstanding A-109's statements, concerns remain about how far to develop hardware below the system level prior to the full-scale system development phase. These concerns arise from the difficulty in separating work associated with maintaining a technology base from engineering effort directed toward meeting a mission need. The Commission on Government Procurement addressed the acquisition of research and development separately from the acquisition of major systems. Similarly, DOD, in consonance with Section 601 of the Congressional Budget and Impoundment Act of 1974, identifies R&D funding for the technology base separate from specific requests for funds to support major system acquisitions. As Featherston points out, however, "it is at the interface between these two areas of activity, the uncertain zone of innovation in design with technologically possible partial answers, that a formalized synthesis has to be orchestrated as government works with the private sector to define every new major system."[12]

In spite of the apparent logic of A-109, it is perhaps presumptuous to believe that its policies will improve the major systems acquisition process.

Resource Management

The Department of Defense recognizes the need to orchestrate its resources and construct an acquisition policy that spans the system life cycle, and brings to bear the business management factors necessary to develop and produce a successful product. In 1978 a DOD official said, "We are establishing an acquisition team responsible at the policy level for all major system program activities including research, engineering, production, industrial relations, standardization, and contracting."[13] This integration policy is needed to help alleviate the problems of demarcation between what should be developed to augment the technology base, and the R&D necessary to support the trade-off among alternative design concepts for major weapon systems.

Underlying the demarcation problem, however, is the far more significant concern for cost. How is exploratory research funded? Where does the funding come from to support R&D and the pursuit of alternative designs for ongoing programs? These questions do not have ready answers, and A-109 offers no suggestions for funding alternative design concepts. Furthermore, Congress has little more than a mission analysis upon which to base its decision to appropriate funds for a new major system acquisition. As Ekas explained, "It is very difficult for decision-makers to commit funds to 'something' yet to be conceived, even though they may be convinced of the need."[14] The Commission on Government Procurement also recognized this paradox:

> To explore different system concepts and introduce a competitive development requires R&D money of a scale usually not made available until a decision has been reached that a given system approach should be pursued.[15]

Finch sees the problem of funding alternative concepts affecting the private sector as well as government. "Not only will the government have to reorient its R&D cost structure, but the manner and level with which contractors expend independent research and development (IR&D) funds may have to be reorganized. The internal funding of contractors for the front-end competition must be rechanneled in response to the required documented studies of mission need."[16] Because IR&D is recoverable as an overhead expense and is dependent on the level of business a company conducts with DOD, this idea, if feasible and implemented, would favor the large contractors over small businesses—a detriment to the intention of A-109 to include small companies in the conceptual stages of a major system acquisition.

Other resource problems that may stem from the implementation of A-109 have been cited, such as defining the role of federal laboratories, and the potential for transfusion of ideas among competing concepts.[17] These problems are not mutually exclusive or new. Transfusion of ideas and technical leveling have, in the past, caused concern during DOD's source-selection process.[18] But with the advent of A-109, a cross-pollination of ideas

among competitors exploring alternative design concepts is even more likely. This may be brought about by the need for close liaison among government project staff whose task is to translate mission needs to the competitors, or in communicating ideas from the technology base to the contractors.[19] The government program manager is particularly susceptible to pressures of this kind and may try to influence a specific design if he sees performance jeopardizing design-to-cost and life-cycle-cost goals.[20]

Defining Mission Needs

Of all the problems related to A-109 that are discussed in the literature, the biggest concern is with the preparation and processing of the Mission Element Need Statement (MENS). The MENS, which has been superseded by a Justification of Major System New Starts (JMSNS), required a description of the need in terms of mission capabilities, the basis for and assessment of the need, a summary of existing and planned capabilities to accomplish the mission, identification of known constraints, and estimations of the resources and schedule to meet Milestone I.[21]

One problem with the MENS was to define clearly a need without indicating a solution, i.e., to scope the program without being hardware- or solution-oriented.[22] This was a requirement that DOD found difficult to comply with; it was hard for DOD to leave the drafting of solutions to industry and it was felt that, "Because we within the DOD are hardware oriented toward mission need solutions, there will be no pure MENS."[23]

Another issue associated with the MENS was the time taken to review and approve it. Delays in approving needs statements were commonplace although there were no clear-cut reasons for them. In fact, it was hoped that the MENS approval process would be shortened because there was no need to define potential solutions in the statements. However, a GAO report states:

> They [the Secretary of Defense and his staff] used 5 months (August 1977 to January 1978) to review the Close Combat Antiarmor Weapons System MENS and the VCX MENS. They also used 5 months to review and reject the Marine Corps surface assault vehicle which has since been resubmitted. The Vertical/Short Takeoff and Landing (V/STOL) MENS has moved back and forth between the Navy and OSD since 1977.[24]

One suggestion for improving the MENS preparation and approval cycle is to use a systems engineering team[25] at the service headquarters. This team would be knowledgeable about the mission analysis that established the service need, be able to provide technical support to the groups involved in developing the MENS, and would help decision-makers understand the thinking behind the document. This systems engineering approach would bridge the gap between the writers of the document and those who have approval authority.

An extension to the system engineering concept is advocated by several writers who want to immerse the user in the acquisition process. Normally, the user is primarily responsible for introducing a weapon system into operational use and plays a major role in establishing mission needs.[26] The suggestion is to employ the user not only to help develop the MENS, but throughout the program, and particularly when the mission need is re-established at each milestone review. Furthermore, with a "bottom-up" approach, those destined to operate a weapon system would be involved in its specification and design.[27] In this way, the user is an important element in controlling the output of a program.

As mentioned above, by issue of DOD Directive 5000.1, dated March 29, 1982, the MENS has been replaced by the JMSNS. While this change may not help the problems in preparing a need statement, justifications for new major system starts have been keyed to the PPBS process. A JMSNS must be submitted for review not later than the POM submission in which funds for the budget year of the POM are requested for a major system new start. This procedure should be kept in mind when reviewing program control issues discussed below.

Program Control

Control of major system acquisitions has its roots in the congressional appropriation and authorization process, and A-109 stresses the need to "communicate with Congress early in the acquisition process."[28] The vehicle for this in DOD is the MENS, discussed above, that is intended to explain why and when a system is required, and what resources are needed to deploy it.

Control then shifts to the agency acquiring the system. In the case of DOD, the Defense Acquisition Executive (DAE) is the principal advisor and staff assistant to the Secretary of Defense for the acquisition of defense systems and equipment,[29] and acts as the focal point for monitoring policy implementation. The DAE also chairs the activities of the Defense Systems Acquisition Review Council at the four milestone reviews in each major system acquisition cycle.

Once a decision has been made to go ahead with a major acquisition, A-109 requires that a program manager be appointed and clear lines of management authority, responsibility, and accountability established. The first task of a program manager is to prepare an acquisition strategy that is, essentially, a program plan that lays out guidelines for managing the weapon system acquisition.

Aspects of Program Control Discussed in the Literature

Program control aspects of A-109 have been given varying degrees of attention in the literature. For example, a discussion of the functions, responsibility, and authority of the DAE has not been found. Neither has the purpose, structure, and value of the acquisition strategy been addressed. Both of these program control attributes are subjects for future research. On the other hand, congressional oversight through the budgeting process has been extensively covered, and the DSARC review procedures and program-manager aspects have been dealt with to a moderate degree.

Congressional involvement in the acquisition process. Mechanisms for communicating with Congress early in the major systems acquisition process were in place well before A-109 was issued. In the early 1960s, Robert S. McNamara (Secretary of Defense, 1961-1968) centralized DOD's decision-making process within the Office of the Secretary of Defense (OSD), and brought proposed new programs to Congress' attention through the planning, programming, and budgeting system (PPBS). After Melvin R.

Laird became Secretary of Defense in 1969, he reverted to a partially decentralized decision-making policy. Acquisition milestone decisions are made by the Secretary of Defense, and fiscal guidelines are issued by the OSD, but each service is required to recommend its own program objectives. These objectives are filed in a program objectives memorandum (POM) and included in the five-year defense plan (FYDP). This policy change shifted competition for financial resources from OSD to the military departments and into the programming phase of the PPBS.[30]

These DOD policy initiatives were forerunners of A-109's insistence on congressional oversight and its desire to control the costs of major weapon systems. The A-109 emphasis on cost control necessitates evaluating each program continually throughout its acquisition cycle and matching the mission need to program objectives and changing program situations. The problem in doing this lies in the timing of decisions. The PPBS, POM, and DSARC processes have to be synchronized.

The PPBS permits the establishment, maintenance, and revision of the FYDP that projects the DOD budget on a 5-year basis for manpower and materials, and 8 years for force levels. The POM provides DOD the opportunity to annually update existing programs and request new ones. The DSARC reviews each major program at two key milestones and makes recommendations to the Secretary of Defense as to the viability of the program and whether it should be continued. The Council also has the authority to review a major system acquisition should the program experience a significant reorientation, a threat change, or a funding problem. Any DSARC decision involving funding changes has to be reflected in the POM and submitted to Congress.

We can see that serious consequences can arise if DOD's funding requests are not in phase with the PPBS. As Goral points out, "The problem is that the PPBS has an annual cycle with rigid decision points, whereas the DSARC process is tied to the technical progress on individual programs. It is obvious, therefore, that the two will not be in phase."[31] The PPBS is already a drawn-out fiscal approval process, and any lack of coordination with the DSARC process can only exacerbate the funding delay. For example, if the first milestone decision (Secretary of Defense approval of the MENS) occurs simultaneously with the preparation and submission of the POM, the earliest date that funds can be available to start the program is 14 months later. If the POM is missed, the delay for funding could be 24 months.[32] It is clear, therefore, that an approved MENS does not mean that funding is available, and is not a signal for DOD to proceed with the program. As Harvey observes, the POM provides the money without authority, while the DSARC decision gives the authority but not the money.[33]

Circular A-109 attempts to place program control in the hands of the program manager, but, at the same time, insists on extensive top-management review.

There is unanimity among the writers on program funding. They stress the need for synchronization between the PPBS, which deals with the money-allocation function, and the expenditure function, which is monitored and guided by the review process.[34] This need is recognized within DOD, which requires each official who has direct or indirect responsibility for the acquisition process to make every effort to "correlate individual program decisions with the Planning, Programming, and Budgeting System (PPBS)."[35] Furthermore, in a March 1981 memorandum,[36] the Deputy Secretary of Defense proposed regular monthly meetings of the Defense Review Board to assure that major acquisition systems are more closely aligned to the PPBS, and that the POM is cut down in size and focuses on major planning and policy issues. The fact that the principal members of the Defense Review Board serve on the DSARC promises more concurrency between the PPBS and DSARC decisions, which may in turn provide means for avoiding affordability problems.

Affordability is the ability to program and budget adequate resources to execute a program in an efficient and effective manner.[37] The Defense Science Board understood the need to consider affordability and recommended that only the most critically needed programs be funded so that the limitations of the congressional budget would not be exceeded.[38] The March 1980 issue of DOD Directive 5000.1 requires that affordability be considered in the MENS and be reconfirmed at every Milestone. However,

> A total DOD-wide integrated, funded, and agreed-to affordability management plan, which Congress would recognize and therefore commit not only near-term funding, but also out-year funding for all program components, is certainly a hoped-for, hard-to-believe, expectation. . . . a combination of the current "bow-wave" in excess of anticipated funding is not too attractive to either the government or industry.[39]

The negative tone of this statement may not be fully justified, particularly in regard to out-year funding. Both the GAO and the DOD favor multiple-year appropriations that make funding available for a specific period, such as 3 or 5 years. After studying 26 Defense Logistics Agency and Air Force contracts valued at $14 million, the GAO identified annual savings of $3 million, about 21 percent, through multiyear contracting.[40] As a result, the GAO recommended that Congress enact legislation giving federal agencies general multiyear contracting authority for supplies and services.[41] In April 1981, Deputy Secretary of Defense Carlucci approved the recommendation of his self-appointed steering committee to "encourage extensive use of multi-year procurement based upon a case-by-case benefit/risk analysis."[42]

Advantages of multiyear contracting have been cited as improving the effectivity of long-range planning, lowering costs by ordering large quantities at

one time, increasing competition for those quantities, permitting contractors to train and retain a skilled work force, and reducing the number of contracts that the government has to administer.[43] The OMB, however, is cautious and counsels weighing these advantages against the disadvantages resulting from reduced flexibility.[44] A similar argument is made by Congress, which sees erosion in its ability to terminate a contract at yearly intervals as it normally can with annual appropriations. Another disadvantage of multiyear contracting is the tendency to lock in a contractor and stifle competition. Overall, however, the acquisition community perceives more advantages than disadvantages, and that multiyear contracting could conceivably shorten the acquisition cycle, a perennial goal of every DOD administration.

The DSARC review process. "Historically, the length of the acquisition cycle has been perturbed by two things—first, disagreement on what is wanted, and second, the tendency to bite off a larger technological chunk than we are capable of digesting."[45] Some think that A-109 policies have also contributed to lengthening the cycle[46] and that milestone reviews are perhaps the main offenders. Moeller, however, found that the review process downstream of the first milestone decision parallels the technical development of the system and, therefore, does not prolong the acquisition cycle. In fact, of the 13 programs studied by Moeller, only two appeared to have been lengthened by the review process, and then only by 2-4 months.[47]

Moeller looked at the mechanics of the DSARC process and concluded that reviews do not have an impact on the length of the acquisition cycle; however, there are two concerns the study excluded. One is the burden placed on program staffs, and particularly program managers, in preparing for and responding to the needs of the DSARC. For example, in the Air Force, individual pre-briefings must be made to the staff at each command level. This entails 51 scheduled pre-briefings before the DSARC, not counting reruns.[48] The second concern is that a strict adherence to the milestone review process tends to lengthen the acquisition cycle by not allowing concurrency, i.e., overlap between program phases.

The arguments against concurrency that partly motivated A-109 are that costs of an acquisition can escalate if production is initiated before design flaws are eliminated; and that no commitment should be made to enter the next program phase unless the need for the system has been re-established. Proponents of concurrency believe it provides for a smooth transition between phases, minimizes acquisition time, and drives the total system to be ready.[49]

From this discussion, we can see that the benefit/cost picture for the milestone review process is not clear-cut. Another question the reviews raise is this: Where do the program manager's responsibilities lie? Circular A-109 attempts to place program control in the hands of the program manager, but, at the same time, insists on extensive top-management reviews. Is it possible that A-109 is perpetuating the management concept of controlling people rather than allowing the people to get the job done?

Program management. Another diminution of the program manager's role that is implicit in A-109 is the requirement that the PM position be filled after the first milestone decision. This implies that the program manager should not participate in the determination of the mission need or in the preparation of the program budget. Instead, the program manager is presented with a charter and is expected to meet the objectives of a "contract" he had no part in drafting. Paragraph E.11 of DOD Directive 5000.1, states:

> The Program Manager shall acquire and field, in accordance with instructions from line authority, a cost-effective solution to the approved mission need that can be acquired, operated, and supported within the resources projected in the SDDM (Secretary of Defense Decision Memorandum).

Judson interprets A-109 as changing the concept of program management from that of problem coping to problem avoidance.[50] He suggests there are two aspects to program management: "mission management" and "product management."[51] The former deals with development of the MENS and the competitive search for a solution to the mission need, and the latter with the development and production of the preferred solution. If adopted, this suggestion could provide a convenient opportunity to change managers without disrupting a program. Typically, an acquisition cycle for a major system spans a decade or more, and because services rotate officers every few years, it is unusual for one program manager to serve throughout the entire acquisition cycle. Circular A-109 recognizes the drawbacks to this practice and states, in Paragraph 8.d., that the tenure of the program manager should be long enough to provide continuity and personal accountability. Referring back to Judson's suggestion, it might be better to specify that a "mission" manager be appointed to guide the program through the conceptual studies before handing it over to a "product" manager.

Innovation

The thrust of A-109 innovation policies is to make industry a partner in defining concepts to satisfy a mission need. In the past, DOD specified system requirements and requested industry to bid for a contract to meet them. The problems with this approach, as seen by the government, are that industry is constrained to meet the government's preconceived solutions and that any modifications to those solutions are costly to implement once the program is under way.

To foster innovation, A-109 requires that government requests for proposals describe mission needs and not hardware-oriented solutions to satisfying those needs. Other A-109 directives require the exploration of alternative design concepts, and competition among many firms, including small businesses, thought to provide the environment conducive to innovative ideas. In the context of the acquisition of major systems, A-109 closely couples innovation to competition on the assumption that the probability of finding innovative solutions is enhanced when competition flourishes.

By stressing the need for industry to be involved in formulating ideas to meet a mission need, the government is looking to industry for inventive ideas and innovation. The notion that innovation is "a process by which an invention or idea is translated into the economy,"[52] does not satisfy the intent of A-109. At issue is a broader concept of innovation incorporating private and public sectors in a multidimensional process consisting of

product, process, managerial, procedural, and social innovation.

Discussion of Innovation Found in the A-109 Literature

The general subject of innovation is treated extensively in academic and professional literature; however, there is a dearth of literature on the subject as it applies to A-109 and the acquisition of major systems. One reason for this may be that the acquisition community sees innovation as a subset of competition. Another reason may result from a perception that innovation is unidimensional, consisting only of technological innovation, and that the results of innovation show only in the hardware development phases of major acquisitions.

The A-109 policies themselves are good examples of managerial and procedural innovations. Their intent is to harness the full range of public and private resources and use them more effectively. Admittedly, A-109 is looking for more technological innovation as the end result of implementing its policies, and acknowledges that the private sector is the most likely place to provide it. Large government laboratories do not have a mission to be technologically innovative, but often serve as brokers between inventors and industry for the development of new technologies.[53] This indicates the need for close coupling between the government and industry that has long been recognized in the development of weapons, space, and nuclear power systems.

A good example of the role government laboratories play in the innovation process is the Navy's Exploratory Development Program. This program solicits ideas from industry, non-profit organizations, and government sources, and seeks to establish a management and support climate in which technological innovation can flourish and in which risk taking is not only encouraged but demanded.[54] Seventy percent of the Navy's exploratory development funding is channeled into the laboratory system, of which 60 percent goes to industry for contractual research.[55] Bottoms and Horwath stress that the technology base in the military is very important to the acquisition process and emphasize the care with which funds should be allocated to exploratory research. These funds should stimulate new ideas that ensure maximum impact on systems presently under development, as well as provide the bases for new systems options.

Pope also sees exploratory development funding as a vital resource, but in his opinion, such funding should be used to fund alternative conceptual studies in the initial phase of the acquisition process before Milestone I.[56] He suggests that the military laboratory systems allocate exploratory development funds without apparent or implied constraints. For example, industry is normally justified in thinking that a new missile system is required to satisfy a mission need emanating from a missile command. This, Pope believes, inhibits a truly innovative solution to a mission need. His proposition is that if A-109 is to be correctly applied, money must be made available for exploring alternative solutions; and, to encourage innovation, the implied solution should be concealed from the bidders in the early stages of the acquisition. This, of course, is the very thrust of A-109's innovation theme.

Because technical performance often overrides price in deciding the winner of a major systems contract, industry has developed highly technical organizations capable of developing new and untried technologies.

From the preceding discussion we can see that government laboratories can play pivotal roles in the major system innovation process. Ideas from every sector of the community have to be solicited, encouraged, sifted for possible application of weapon systems, and funded for further development where appropriate. Exploratory development funds are a suggested source for priming the innovation process to the extent of supporting the concept definition phase (Phase I of the acquisition cycle). This is a very interesting point that suggests a shift in thinking with regard to where the acquisition cycle should begin. Should the military technology base functions be expanded to include the study of alternative design concepts with industry support?

Competition

Competition is the bedrock of the American free-enterprise system, and it is therefore not surprising that government policies espouse its virtues and dictate its use in the acquisition of goods and services for the public good. Circular A-109 constantly refers to the need for competition in the acquisition of major systems. Its policies imply the need for competition on two levels. The first level requires competition to the greatest extent possible among a broad base of industrial firms for multiple, parallel contracts. This is particularly important in the initial phase of a program, when approaches are defined that will satisfy a mission need. The intention of A-109 is for this level of competition to be continued as far into the acquisition cycle as practical. However, as the cycle progresses beyond the first phase, the competition moves more toward a technological level on which alternative concepts compete for further development and/or production. To appreciate the nuances behind A-109's competition theme, an understanding of the weapon systems marketplace is required.

The Weapon Systems Marketplace

There are various complicating factors associated with selecting contractors for major system acquisition. These factors, coupled with the technical sophistication of the weapons themselves, have led to a unique structuring of the weapon systems marketplace. Several perspectives on the defense market have been offered in the literature and there is a common thread that links the opinions. All agree that the marketplace has oligarchical tendencies and does not resemble a free market in the tradition of Adam Smith, the 18th century Scottish political economist and author.

Gansler perceives the defense market as exhibiting a severe and unique form of oligopoly competition or rivalry.[57] Corey, while not so specific, observes that in defense acquisition, the market

does not fit the "perfect competition" mold, and implies that its structure is explained better by oligopoly models.[58] One factor contributing to this situation is that each service within DOD has developed preferred-status relationships with companies that it has grown to trust over the years. This has led some writers to characterize the defense market as a bilateral oligopoly in which several government entities interact in the market with few sellers of a given product.[59] Extrapolating this situation, the same authors postulate a scenario in which a fine-grained market segmentation and product specialization could produce a bilateral monopoly where a monopsonist (the government) buys from the monopolist (one firm) at a given time.[60]

This oligopolistic situation is exacerbated by the considerable degree of concentration existing in the defense market as a whole, and a particular lack of price competition in the major systems market. Because technical performance often overrides price in deciding the winner of a major systems contract, industry has developed highly technical organizations capable of developing new and untried technologies. This is an expensive and risky operation, and one that few companies can afford. The consequence is that DOD procurement funds are channeled into relatively few, high-technology companies that have developed the resources to handle the design, development, test, and production of major weapon systems. A study of the defense industry shows that in 1978, 25 companies controlled 50 percent of DOD's total business, while the top five companies accounted for 20 percent.[61] More significant in the same time frame, 40 percent of DOD's procurement dollars were earmarked for only 20 programs.[62]

Because of concentration in the defense industry, and particularly in specialized areas such as aircraft engines and spacecraft launch vehicles, pure competition, as typified by rivalry among many small firms, is lacking. This may not, however, be too detrimental in furnishing DOD's needs, because when a few highly qualified companies are competing for a large prize, whose value has been essentially set by the customer's budget, there is a likelihood that the competition will be both fierce and innovative. This was one of the conclusions drawn by the Commission on Government Procurement,[63] which also said that, overall, the interests of the government would be served better if many companies were involved in the competition.

Mechanisms for Stimulating Competition

Discussions on the competitive aspects of major systems acquisitions fall largely into two categories: how to stimulate competition for the first phase of the acquisition cycle, and evaluations of mechanisms used in the production phase to ensure competition. The former is treated superficially in the literature, which emphasizes problems with communicating data from the government to prospective bidders.

Functional specifications and foreground data. Corderman's appeal for more widespread use of functional specifications[64] is reinforced by Unruh, who believes this type of specification encourages bids and proposals from firms that would normally not bid on a detailed specification.[65] This opinion is shared by many writers who echo the Commission on Government Procurement's recommendation to use specifications that are non-specific in terms of equipment design. The term "functional specification" is, to a large extent, replacing "performance specification" as a means to convey the government's need, and is defined in the Chiles Bill this way:

> . . . a description of the intended use of a product required by the Government. A functional specification may include a statement of the qualitative nature of the product required and, when necessary, may set forth those minimum essential characteristics and standards to which such product must conform if it is to satisfy its intended use.[66]

In their simplest forms, DOD functional specifications could be facsimilies of the Mission Element Need Statements. If a MENS is issued to industry under the guise of a functional specification for the purpose of soliciting proposals, it surely satisfies the intent of A-109. However, Eisman sees a problem with this approach, and expresses concern that potential bidders find it difficult to obtain foreground data. These data, developed under government-funded contracts, are government property that contain information essential for conceiving solutions to operational deficiencies identified in a MENS. To many companies, the lack of foreground data is a barrier to entry into a competitive-proposal situation and, to overcome this, Eisman suggests that DOD's technology base be made available to prospective competitors through access to a service-wide computer data base.[67] Another of Eisman's suggestions is to provide competitors with a threat scenario during the pre-proposal stage and ask for comments.[68] The security risks associated with Eisman's suggestions may render them impractical, but his points do cast doubt on the assumption that the use of functional specifications automatically enhances competition.

In theory, concerns about the unavailability of foreground data should not exist. In 1967, the Freedom of Information Act became law, allowing the government to disseminate information previously submitted under government contract or in response to RFPs. The problem is that a request for specific information has to be made in writing, and this requires a knowledge of its existence. The Act introduced another dimension to the problem of availability of data, however. A study by Muhn found evidence that some companies among the nine largest recipients of Air Force contracts in 1978 withheld technical information from their proposals for fear their competitors would have access to it.[69] Government program managers responsible for the programs concerned believed, however, that if this had occurred, it did not influence the results of the competitions. Whatever the merits or demerits of Muhn's study, it brings to light the potential that losing competitors could obtain proprietary information about the winning contractor's proposal. One solution to this problem is for bidders to identify proprietary information in their proposals, thus automatically preventing the government from releasing it to other sources without permission.

Competition in the production phase. Studies and papers dealing with the production phase of weapon system acquisitions usually concentrate on cost savings due to competition, and are predominantly quantitative. Lovett and Norton, for example, developed a methodology for estimating net savings due to competition in the pro-

duction phase. To test their methodology, they studied 16 items that had originally been separately produced after sole-source awards, and later reprocured in a competitive environment. An estimated unit price for each reprocured item was established, based on the assumption that the original manufacturers would have continued along their first-lot learning curves. These unit prices were compared with prices projected from curves used by manufacturers of the second buys. The second-buy prices were adjusted to include government reprocurement costs, but the results still showed an overall savings of 10.8 percent on the 16 items.[70] The authors point out, however, that five of the reprocurement contracts were more expensive after they had been competed for.

The same paper by Lovett and Norton, and their more comprehensive report[71] on the same subject, provided an impetus for research into cost savings in the production phase of DOD acquisitions. At the Ninth Annual DOD/FAI Acquisition Research Symposium, the subject was addressed in four papers by Brannon,[72] Drinnon and Gansler,[73] Smith, [74] and Solinsky.[75] Brannon extended the Lovett-Norton model by segregating cost savings into those due to competition and those due to learning. Brannon showed that the difference in cost between successive buys of the same item was greater than would have been the case if the first-lot learning curve had been simply extrapolated into the next buy (as would presumably happen if the second buy was awarded on a sole-source basis). Overall, Brannon found that from the 22 cases studied, an average of 7 percent savings accrued from competition alone.

Drinnon and Gansler took the Brannon model a step further to show that cost savings due to competition had three components: reduced profit, a lower first-unit cost, and a steeper learning rate. The separation of profit from unit cost is of academic interest only because competition would probably drive these factors together in any case. To the practitioner, a refinement of this nature is of little consequence. Of greater importance is the conclusion drawn by the authors that competition produces higher savings than expected. One case, of 45 programs studied, showed an overall savings of 17.5 percent comprised of 12 percent saving in profit and unit cost combined, and 5.5 percent from a steeper learning curve.

Smith's paper highlights the complexity of competitive factors, in addition to providing a mathematical model for evaluating competitive alternatives. The model accounts for sole source; split-awards; head-to-head, winner-take-all competition; and the strategy to layaway in which an alternative production source maintains preparedness but does not actually manufacture end items. The assumptions made to support the model include equal spare capacity and efficiency of the competitors, no buy-ins, and the exclusion from the model of nonprice factors such as the need to make split awards to maintain reserve production capacity.

The program manager's responsibility also appears to be eroded by A-109 if, in fact, its policies are followed and the manager does not participate in the budgetary process until after the first milestone decision.

The split-award procedure usually followed by DOD has serious drawbacks. In the production phase of a weapon system acquisition, competition is often limited to two companies, and the predetermined split in production quantity is established. For example, a decision may be made to award the lower bidder 60 percent of the quantity with the remaining 40 percent going to the competitor. This fixed-quantity split results without regard to the price differential between the two bids. Another problem with this practice is that a competitor may decide that 40 percent of the production quantity is adequate for his capacity and, hence, has no incentive to lower his price. These problems prompted the U.S. Army to experiment with a different procedure. In 1978, awards for a night-vision system were split between two contractors. Each bidder was made aware at the outset of the competition that the award ratio could go as high as 90:10, depending on the mathematical function of the difference in bid prices. This approach proved a stimulus to the competition, and it was estimated that a cost saving of between 8 and 9 percent was realized.[76]

We may conclude from the above discussion that sufficient evidence exists to justify competitive procurements in the production phase of a weapon system acquisition. There is a clear consensus among the authors of the papers reviewed that carefully orchestrated competitions realize net savings over sole-source procurements. A more definitive statement is not possible, because data from several papers are not based on the same assumptions and therefore cannot be correlated.

Summary

It is generally perceived that the acquisition of major systems is a high-risk process. Circular A-109 recognizes this, and attempts to alleviate the propagation of a bad design into the production phase by advocating competition among alternative designs, and by delaying the development of subsystems until it is known that they are definitely required for the preferred solution. In this way, A-109 is making every effort to reduce downstream risk by encouraging innovation and competition, an approach supported by Gilder who believes that, "In a perilous and changing world the best defense against risk is innovation and creativity, research and discovery, competition and enterprise."[77]

In regard to the program control aspects of A-109, it is apparent that there is more subjectivity than objectivity expressed in the literature. One point of consensus is in the need to marry the PPBS and DSARC processes to ensure continuity of program funding and the timely availability of resources. As an adjunct to this, there are persuasive arguments in favor of multiyear funding to help stabilize the major system acquisition process and shorten the cycle. The length of the acquisition cycle has constantly given DOD cause for concern over the past decades, and the idea of erecting hurdles at certain

milestone points in the cycle has been perceived as detrimental to shortening the process. Furthermore, the DSARC reviews are seen as a burden to program managers. The program manager's responsibility also appears to be eroded by A-109 if, in fact, its policies are followed and the manager does not participate in the budgetary process before being appointed after the first milestone decision. Overall, the acquisition community is less than enthusiastic about A-109's program control initiatives and poses the question: "Is it possible that the costs [of control] outweigh the benefits of control?"[78]

Innovation as a stand-alone topic is given virtually no attention in the literature, which displays, however, no sign that the acquisition community disagrees in principle with the A-109 requirement for innovation, or in its approach to achieving it. The difficulties with implementing the policies such as funding alternative designs and writing functional specifications have to be overcome by the government, which must also assume the role of broker for innovative ideas, and ensure fairness of dissemination. Additional A-109 policies concerning participation of small businesses in the acquisition process and the tailoring of government documentation to satisfy the minimum dictates of individual programs are not explicitly addressed in the literature.

Competition is more extensively covered in the literature and is recognized as a public good; however, there are some unique aspects of the defense systems marketplace that deserve attention. Because of the technical complexity of weapon systems and their priority in the nation's affairs, a highly proceduralized system for acquiring major systems and awarding contracts has evolved. This precipitated an oligarchical relationship among few buyers (the services) and few sellers, and erected many barriers to entry and exit that are difficult to penetrate. Such a situation produced its own brand of competition with emphasis on technical aspects rather than price, and explains why foreground data is a thorny issue.

There is a consensus in the acquisition community that competition is especially beneficial after a weapon system has been fully developed. Several studies show that savings greater than 7 percent can accrue if a competition is held for the production phase of a program rather than resorting to a sole-source procurement. Similar studies that quantify competitive aspects for earlier phases of the acquisition cycle were not found in the literature. Neither was any discussion found regarding the advantages of soliciting proposals from a broad base of industrial firms. These appear to be a particularly fertile area.■

Notes

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14. Claude P. Ekas, Jr., "Competitive Concept Formulation—A New Feature in the Acquisition Process," Proceedings of the Navy Systems Acquisition Symposium, October 27-28, 1977, p. 148.
15. *Report of the Commission on Government Procurement*, GPO, Washington, D.C., December 1972, Vol. 2, p. 137.
16. Donald Leslie Finch, "Evolution and Implementation of Office of Management and Budget Circular A-109," master's thesis, Naval Postgraduate School Monterey, Calif., December 1977, p. 82.
17. The Honorable William J. Perry's Statement, p. 17.
18. Public Law 87-653, the "Truth in Negotiations" statute passed in 1962, requires DOD to hold discussions with the offerors in negotiated procurements. This resulted in criticisms of DOD for apparently indulging in technical leveling of the proposals and of making an award based only on price. The present DOD four-step source-selection procedure, delineated in the defense acquisition circular 76-17, dated September 1, 1978, is designed to alleviate this problem.
19. Finch, p. 81.
20. Dean E. Roberts, "OMB Circular A-109 Impact on New Development and Leveling Effect." Proceedings of the Eighth Annual DOD/FAI Acquisition Research Symposium, p. 297.
21. Perry's Statement, p. 16.
22. Department of Defense Instruction 5000.2, Encl. 2.
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Airpower Symposium Set

The Air University eighth annual Airpower Symposium will be held March 5-7, 1984, at the Air War College, Maxwell Air Force Base, Ala. The purpose is to provide an open forum for exchanging ideas on airpower among key military and civilian theorists and practitioners. The symposium will focus on the role of airpower in security assistance from a U.S. Air Force perspective.

When the U.S. Air Force assists other nations in meeting their defense needs, it is positively contributing to the attainment of U.S. foreign-policy goals. The world-wide demand for U.S. security assistance is increasing due to the superior quality of U.S. equipment, the nation's unmatched reputation of supporting what is sold, and the desire of many nations to be associated with the United States.

The thrust of the 1984 symposium is to examine, in some detail, U.S. Air Force security assistance policy and responsibilities, the challenges inherent in the U.S. Air Force providing security assistance to other nations, and the outlook for the future. Panels will be formed into four topical areas, and papers will be presented to illustrate problems, policies, developments, and recommendations. Panel proceedings will be published to stimulate continued interest and imaginative thinking throughout the civilian and military communities.

Panels will be formed as follows:

1. *Security Assistance Policy, Responsibilities and Organization*, including legal statutes and requirements, organizational interrelationships for providing security assistance, policy development and assessment, sales decision-making, and the role of industry.

2. *Implementation of Current USAF Security Assistance Program/Training*, including program planning and execution, success of current programs, effectiveness of policies and procedures, implementation responsibilities, and meeting users' needs.

3. *Impacts of Security Assistance on the USAF*, including USAF warfighting capability, logistics support base, production capacity, and adequacy of resources.

4. *Issues, Initiatives, and Trends*, including foreign military sales financial management, technology transfer, advanced fighter aircraft, balance of power considerations, congressional concerns, special defense acquisition fund, and future programs.

More information on the symposium may be obtained from:

LtCol Richard J. Eyermann, USAF
Airpower Symposium
Air War College (AWC/EDRP)
Maxwell AFB, Ala. 36112

Telephones:
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Commercial: (205) 293-2831

Program Instability **Fighting Goliath**

Lieutenant Colonel
William D. Brown, USA

Today in the world of systems acquisition management there exists an unconquered and ever-present "Goliath" that is threatening our ability to develop new modern weapon systems. That Goliath is the invidious program instability that confronts us in virtually every program. This Goliath has existed for some time but only 2 years ago was his antithesis, program stability, positively identified by then Deputy Secretary of Defense Frank C. Carlucci. Since that time, the friendly forces of the Department of Defense have sought to find their "David," in the hope of dealing a mortal blow to the program instability monster, thereby freeing program stability to reign supreme over the acquisition world forever after. Alas, I must acknowledge that David has not yet been located. My purpose in the brief discussion to follow is to come to grips with a more accurate characterization of Goliath, so that we may see what David must look like when we search for him—or, failing that, how we must develop our own David. With this somewhat allegorical opening estab-

lished, we'll move into some mundane surroundings (for a time) to consider program stability, the fourth of the 32 initiatives proposed in the Acquisition Improvement Program.

A Definition of Program Stability/Instability

The first step in any analysis or study is generally recognized to be a definition or statement of the problem. Perhaps one could expect such a definition in the Deputy Secretary of Defense's release on the Acquisition Improvement Program, but it is not there. In a cursory survey of the literature on the topic, often no definition is offered, and those given are all different. One service's initial view was that program stability was a combination of multiyear procurement and efficient production rates. An Army Procurement Research Office questionnaire defines program instability as disruptive turbulence in the acquisition process that causes the project manager to deviate from his established acquisition strategy.[1] Still another view holds that program stability, as one major subarea within the acquisition improvement initiatives, includes Budget to Most Likely Cost (No. 6), Budget Weapon System for Inflation (No. 18), and Improve Source Selection Process (No. 20).[2] If there is a widely agreed-upon definition of program stability, then I have failed to discover it. It is certainly to no one's discredit that such a clear and unambiguous statement may not exist—Goliath is indeed a giant, and it is most difficult to comprehend his expanse. Almost any ill that befalls a weapon system acquisition program can ultimately be charged to program instability! Though rather naive in the ways of system acquisition, I will not fall into this beguiling trap and try to offer that elusive conclusive definition. Rather, I will attempt to identify and categorize the many indidividual elements that make up program instability and develop a "work breakdown structure" for this instability, in the hope of assisting our community in better recognizing our "enemy." I will also try to expose some pressure points where we might best try to marshal our efforts in this fight.

The Structure of Program Instability

The same literature survey that found no single recognized definition for program stability/instability was much more fruitful in identifying factors that contribute to instability. The ultimate list I derived (see Figure 1) is based on sources too numerous to mention, but blame for any perceived incompleteness or inaccuracy lies solely with the author. For my "WBS," program instability is the Level 1 element—the "system," if you will, as noted in the diagram. The majority of the elements identified at Level 2 were derived from the Army Procurement Research Office survey mentioned previously. Level 3 shows the principal sub-areas of instability, and Level 4 of the WBS is the list of individual elements I identified.

Most aspects of the WBS are self-explanatory, but a few comments might serve to fit the whole structure together better. First, it is useful to note that requirements and technology are not the real "drivers" in instability, in my view. On the other hand, the funding, government management, personnel, political, and defense industry elements intuitively appear to be significant in their impact. Some selected illustrations may highlight the magnitude of the problem and its interrelationships. Under scheduling effects, uneconomic production rates is listed as a factor. The result of this is to stretch out the program, which invariably will increase the unit production cost. To avoid this, we must incur up-front costs to maintain stable, economic rates, and recover those costs (and savings, we hope) at the end of the production contract.[3] Speaking of stretchout, Norm Augustine's 5th Law for Major System Development Programs suggests that: "If present trends persist, most new systems will be obsolete only slightly before they are born."[4] The government management-institutional area includes lack of discipline in planning for the out-years as a key source of program turbulence.[5] In the same area, flexibility, generally considered

to be good, is listed as a destabilizing element, since the services and, indeed, DOD, may be unwilling to firmly commit resources to stabilize one program at the expense of another. Even the DSARC (government management-organizational) has in the past contributed to instability since it was not linked to PPBS and the resource allocation process. That was addressed this past year and should be less a factor in the future.[6] Deputy Secretary of Defense Thayer commented on another problem area (personnel policy) when he noted that the program manager (PM) ranks are still hampered by the military system of job rotation, and he suggested longer PM tours of duty are imperative.[7] An indication of this situation and an important amplification of it can be seen by the average tenure of PMs—30 months—*and* the average tenure of service secretaries and senior OSD officials—also 30 months! This contrasts with the average tenure of the U.S. senator who reviews DOD programs—more than 10 years.[8] There are similar explanations for the other elements, but for the sake of brevity they will not be included in this discussion unless singled out in the following as key "pressure points" for overcoming instability.

The Analysis and the Challenge

There is a prayer that says:

> God grant me the serenity to accept the things I cannot change,
> The courage to change the things I can,
> And the wisdom to know the difference.

So must we approach program instability. The political area largely falls outside our realm of influence, as does a large portion of the industry area. Of the areas remaining, funding, scheduling, government management, and personnel offer the greatest potential for beneficial change. As expected, these are intertwined in many cases and cannot be addressed in isolation. One example of this is that Action 4 (Program Stability) requires that OSD and the services fully fund both R&D and procurement of major systems at levels necessary to protect the baseline acquisition strategy.[9] This means that, in the funding area, we must be able to determine what funding is required, and in the government management area, we must be willing and able to secure that level of funding. There is a potential for instability here if what the services do to have a program is to "cut the foot to fit the shoe." The services may have an incentive to avoid determining what a program will really cost, focusing instead on "must cost"—what can be carried into the budget battles.[10] This may hamper or eliminate the incentive for improving our cost-estimating capability—a major part of the budgeting process.

Just as unrealistic cost estimating sets us up for destabilization, so also does unrealistic ("success-oriented") scheduling. Stretch-outs are linked to funding and, in turn, to government management. Since government management also largely drives the personnel area, it would be tempting to draw the conclusion that almost all instability can be ascribed to this one principal element—it would also be overly simplistic.

Within the government management area, the procedural and organizational categories are being addressed in part by other acquisition improvement initiatives and are relatively susceptible to change. On the other hand, the institutional area is largely resistant to change and it forms a concentration of the pressure points for change. There is a strong constituency surrounding the various elements in this area, and if we are to dramatically increase program stability, we will have to successfully challenge and overcome many of these detractors. To revert to our earlier allegory, this is the heart of the Goliath which we must strike. As an example of the intractable nature of these elements, let us consider accountability. Many would argue that management has defaulted on the fundamental management principle of accountability, because of the successful proliferation of advocates throughout the acquisition process. Stated another way by Norm Augustine in his 16th Law, the Law of Limited Liability: "The problem with the acquisition process is that by the time the people at the top are ready for the answer, the people at the bottom have forgotten the question."[11]

Our target, then, is a management process that may be characterized by a lack of discipline and accountability, prone to short-term suboptimization, fraught with institutional rivalry and competition, and unable to make hard and decisive choices among alternatives. Having hopefully better analyzed Goliath, where and who is our David, and what is his armament?

A Possible Agenda for Action

In today's acquisition environment, for better or for worse, the Congress often makes decisions to kill or to support specific weapon systems. They are becoming more activist in their approach to weapon system development, and their increased role accordingly reduces the ability of the DOD to manage its programs. A recent issue of *Army* magazine, commenting on go/no-go decisions on weapons systems, observed that the JCS is not institutionally equipped to discriminate among the critical programs of the services, and the OSD has refused to do so.[12] Deputy Under Secretary of Defense William Long, in his report on the first-year progress of the acquisition initiatives, noted that there is a need to minimize top-line instability on major programs through such vehicles as avoiding unaffordable new starts and the internal discipline to make complete program cancellations rather than stretch-outs.[13] More recently Deputy Secretary of Defense Thayer indicated that the system needs more guts than it is willing to display, the guts to cancel a marginal program. He indicated he would identify marginal programs and get rid of them as there will be budget cuts in Congress, and we have to prioritize our systems to a greater degree than before.[14]

Given such pronouncements as these, what can be expected and what should be done? First, we do have an existing decision-making vehicle in the PPBS cycle—a vehicle that reaches down well into the services and one that is available to all levels of decision-makers. If the right decisions are not always being made at present, it is not because we lack the mechansim to do so. Too often, perhaps, the advocacy that begins with the user (who has no funding involvement) and the PM (whose own success is tied to his program's) keeps the marginal programs alive, despite the negative impact it has

(continued on page 61)

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Tied up in Knots Trying to Do P³I?

A Few Basic Ideas for Implementing Preplanned Product Improvement

Captain James S. Knox, Jr., USAF

The P³I Phenomenon

The past 30 years have brought dramatic changes in the charter of defense acquisition programs. The time required to bring a new weapon system from inception to deployment has stretched to the point that our ability to keep pace with both technology and the threat is suspect; the increasing cost of today's weapons sytems is under severe scrutiny and criticism, both internal and external to the Department of Defense. Further, the life span of individual systems continues to increase, as evidenced by our aging fleet of B-52 strategic bombers. These are but a few of the factors that led to 32 specific actions taken by Deputy Secretary of Defense Frank C. Carlucci in April 1981 to improve the DOD acquisition proc-

ess. These actions, now known collectively as the Acquisition Improvement Program, address issues in program stability, contracting, cost growth, and readiness. One action in particular, titled Preplanned Product Improvement, espouses an evolutionary approach to the weapon system development process.

The preplanned product improvement (P³I) action has sparked considerable discussion and changes in program strategy since its introduction. The basic concept is that a well-planned system evolution can make better use of rapidly changing technology—while also meeting changes in the threat—than can a new system development. Additionally, the P³I approach is likely to be less costly in the long run than development of new systems. The now-familiar step chart (Figure 1) concisely displays the P³I concept. The major objectives behind the P³I initiative appear to be to (1) minimize weapon system development and modification costs and (2) reduce program risk in implementing current technology while meeting the advancing threat. While there should be general agreement that these are truly noble objectives, the problem that has arisen within the acquisition community lies in the details of implementation. There is little guidance and no accepted method of implementing a P³I program; to help prevent the concept from becoming little more than a buzzword lost in the obscurity of rhetoric, this article will present some basic ideas in answer to the question, "Just how does one 'do' P³I?"

An Approach to Implementation of P³I

As in any acquisition program, agencies within the service must reach agreement on the requirement to be satisfied and the acquisition strategy. This may seem trivial on the surface, but it is absolutely crucial. The service and the Department of Defense must demonstrate a strong commitment to the acquisition of a weapon system under the P³I concept. This commitment must be both outward to the Congress and the public and inward to the elements of the service. Such commitment may help to avert problems such as those experienced by the Navy on the F-14 program: Planned improvements went largely unfunded, causing the Navy to accept what is believed to be an interim capability for a long-term mission.

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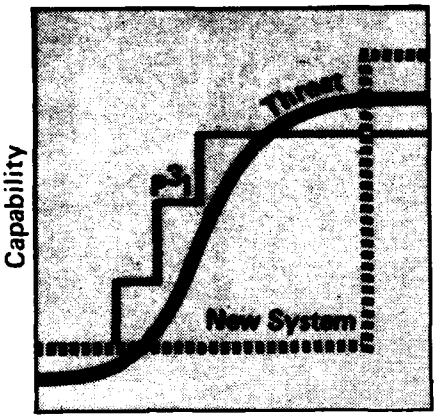
Figure 1. The P³I Concept



Development Considerations

In considering the development of a system under the P³I concept, the program office must consider not only the development of the "improvement," but also the actions that must be taken in designing the baseline system to support the improvment. Once the operational requirements and threat assessment are understood, the range of alternative approaches for the improvement must be determined and the requisite technology for each assessed. For relatively near-term efforts, the applicable technology can probably be examined in government laboratory or contractor independent research and development programs; consequently, alternate approaches to the problem may be identified fairly easily. An assessment of a long-range improvement, however, may prove to be much more difficult. While ongoing exploratory development programs may provide some assistance, a technology forecast should not be overlooked as a planning and assessment tool.

The development of the system improvement must be approached with great care. The P³I strategy has most likely been applied because the state-of-the-art in the applicable technology is such that the risk in achieving the improved capability in the baseline is not acceptable. Therefore, a systematic approach to the design process is certainly in order. A design-test-update design philosophy must be implemented by first designing, fabricating, and testing breadboard hardware, leading to fabrication and test of brassboard hardware before a usable "packaged" design is released. The newness of the technology involved, coupled with the relatively leisurely pace of the development, makes the improvement development an excellent candidate for up-front reliability and producibility efforts. In fact, these areas are often major program drivers when advanced technology is involved and probably warrant even greater emphasis on the development of the improvement than on the baseline system. As other writers have pointed out, the improvement should be designed to be as modular as possible to minimize integration and retrofit action in the baseline system. But modularity may be easier said than done. To properly design the improvement to operate within the basic system, significant planning and engineering work must be accomplished prior to initiating the improvement development.

The basic system must be designed from the beginning with the preplanned product improvement in mind. Modification and retrofit costs will be inversely related to the amount of up-front attention given to designing the system to accept the improvement. This, of course, involves allocation of weight, power, volume, cooling, and interface connections for the improvement. But how do you know how much to allocate? The place to start is with the technology assessment performed for the improvement. The assessment should provide a good basis for estimating the improvement's physical characteristics. This information can then be considered together with system operational and design requirements to form a development specification for the improvement. This B-level specification is the cornerstone of the P³I program—it will govern the development of provisions within the basic system to support the system improvement, as well as guide the development of the improvement itself. From this specification, detailed interface control drawings can evolve as both development programs progress. Although a B-level specification on the surface may seem more detailed than

necessary at a very early point in the improvement's development cycle, it is reasonable to assert that enough information will be known early enough to produce a credible document. The care given to preparing as well as maintaining the development specification and interface control drawings will be reflected in the compatibility of the basic system with the system improvement when the two are tested together.

Testing of the improvement must be considered as a part of the test planning for the basic system. The primary motivation for this comes from the need to accurately identify the system assets required to test the improvement when it becomes available. Depending on the degree of concurrency between the basic system and the improvement programs, either refurbished development baseline systems or actual production systems will be required to test the first improvement items. Unless these are planned for early, they will not be available. Also critical is timely feedback from the basic system test program to the improvement development. Changes made as a result of testing that affect the improvement design must be documented and passed to the improvement designers in a timely manner. This feedback should also include test data from the basic system test program. For example, "real" environmental data can be allocated and provided to the improvement development, rather than forcing the designers to rely completely on standards and analytical models. The test program should also consider an effort to verify the provisions for the improvement contained in the basic system. Depending on the complexity of the provisions and the concurrency between the programs, the testing required could range from (1) no testing to (2) development of an improvement emulator to (3) marriage of a breadboard or brassboard version of the improvement with the basic system.

Management Considerations

The day-to-day management of a P³I program will differ little from the management of any other program. There are, however, several managerial aspects that the program manager may wish to address during formulation of the acquisition strategy. First among these is an issue of program management responsibility for the improvement program. Who is responsible, the program office or another agency? It would seem a common occurrence for the improvement program to be in advanced development while the baseline program is in full-scale development or production. An option is to transfer management of the improvement to a laboratory until it is ready to transition to full-scale development. The program manager must carefully weigh the available manpower and expertise of his organization against the loss of control he may experience by allowing management responsibility to leave the program office. A nearly identical issue exists at the contractor level. Should the improvement program be contracted through the system prime contractor, or contracted separately and provided as government-furnished equipment (GFE) to the prime? Although contracting through the prime may at first seem more costly, it may in the long run be the less expensive alternative. Since the improvement is assumed to make use of new technology, the government in general is not in a position to accept performance responsibility for the improvement as would be the case if it were provided as GFE to the prime contractor. Moreover, although interface control drawings between the basic system and the improvement exist, minor changes during the development cycle are to be expected. The prime contractor is in the best position to control and evaluate such changes.

The improvement program must not become the unfavored stepchild of the program. It must be an integral part of the PM's planning and execution.

The program manager may wish to consider whether the basic system and the improvement should be budgeted separately or as a single effort, although in fact he may have little or no input to this decision. If budgeted together (i.e., the same program element), each can act as a source of funds for the other. Obviously, this can be both good and bad—the most negative aspect from the P³I perspective being that the improvement program may continually be used as a source of funds to offset cost growth from the basic program. This causes the improvement program to be effectively halted. As separately budgeted items, the improvement program competes on its own merit within the PPBS cycle; however, by virtue of its being in another program element, another source of below-threshold reprogramming authority may become available to the program manager.

Most importantly, the improvement program must not become the unfavored stepchild of the program. It must be an integral part of the program manager's planning and execution; otherwise, its effect on other aspects of the program—logistics supportability in particular—may be overlooked. As a brief example, consider the effects of the improvement on the system support equipment program. Is new support equipment required to maintain the improvement? Can it be maintained by the system support equipment? Can the system support equipment have the necessary capability easily designed in up-front? Clearly, the answers to these questions are peculiar to a given program. But one thing is certain. Failure to consider the system improvement in all aspects of planning may greatly affect the approach taken in many aspects of the basic program and may ultimately govern the degree of success of the P³I concept as a means to achieve an operational capability.

Summary

The preplanned product improvement concept, in theory, will allow much more productive use of increasingly scarce national defense dollars. The implementation approach presented here has addressed many essential technical and management questions to provide program managers with a starting point in planning a program with P³I in mind. Although a P³I effort may well add additional management complexity to the program, the results will pay great dividends both to the operational community and to the taxpayer. ■

The Air Force Tackles The Readiness Issue Through Automatic Test Equipment

Charles M. Wheelock

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The Air Force is placing ever-increasing emphasis on electronics. As our manpower has declined during the past decade, we have looked to electronics as the means to increase both our capability and mission effectiveness; however, this dependence has not been without cost. The electronics in modern weapon systems have reached a level of complexity where we are unable to deploy a major avionics system without fielding unique, complex, and expensive automatic test equipment (ATE) in order to provide effective support. We are becoming so dependent upon ATE that a significant portion (75 percent) of the support equipment budget is devoted to developing and acquiring automatic test systems. When one adds the necessary operational and support costs for the ATE systems, the total cost becomes substantial. There are several factors contributing to this large drain of financial resources. They include today's rapidly advancing technology, skyrocketing costs of the equipment itself, and the ever-increasing life expectancy of our major weapon systems, which have, in turn, forced an increase in the life-cycle requirements of our test equipment.

Looking at this drain from another perspective, about 70 percent of the life-cycle cost (LCC) of any system is "locked in" quite early in the acquisition cycle. This locking in of LCC becomes an even more serious culprit when considering ATE. Traditionally, these Air Force systems have been developed and acquired as part of the prime mission equipment acquisition process and were designed to support only one weapon system. Further, they were frequently the last item of consideration in the weapon system acquisition process and were given only limited attention. Little or no thought was given to developing ATE systems with applicability to more than one weapon system, much less to the ATE that was designed to keep pace with advancing technology. Consequently, the Air Force has been forced to spend ever-higher percentages of its acquisition budget to totally replace the older automatic test systems and a larger percentage of its support budget to supply and maintain the proliferation of ATE that has resulted. This does not even address the logistics nightmares that have been created for field commanders who must deploy with exorbitant spares requirements just to support the ATE.

This weapon system support problem had become one of such magnitude that, in December 1975, then Air Force Chief of Staff General David Jones expressed his concerns in a letter to the Commanders of Air Force Logistics and Air Force Systems Commands. His concerns included the rapid proliferation of automatic test systems, the lack of acceptance of lessons learned, not being able to hurdle the "not-invented-here" syndrome, and the need to more centrally manage our ATE efforts. Some of the problems facing the Air Force community regarding ATE were (1) late and immature software being sent to the field, which resulted in 70 percent of the design errors found only after deployment; (2) 434 configurations of automatic test systems, each with its own unique technical, training, and logistics support requirements; (3) 42 different test programming languages in use; and (4) 40 percent of the resources at the AFLC software support centers being consumed in debugging software.[1]

To combat this problem, in 1976 the Air Force established the Modular Automatic Test Equipment (MATE) program. The goals of the MATE program are to provide improved weapon system support through preplanned commonality of hardware and software, using current industry technology and consistent management practices. The MATE system consists of two major themes: a business approach and a standardized ATE interface architecture. The business approach is contained in the MATE Guides (discussed below). It will be exercised locally by various program offices and other USAF activities in order to provide consistent policy on the what, when, and how of buying, fielding, and supporting automatic test systems, and to eliminate mistakes of both omission and commission which have plagued Air Force acquisitions for years. The standardized interface architecture is contained primarily in the MATE Development Guide. It consists of the various hardware, software, and human engineering standards that define the interfaces in any automatic test system. These standard hardware, software, and human interfaces will be common across all test stations designed using the MATE approach. This allows all test stations at a given maintenance location to share spares. It allows individual test stations to evolve with technology, thus voiding costly replacement programs. Used together, the business approach and architecture provide for improved sup-

portability of Air Force weapon systems resulting in higher availability for prime systems and lower costs for their support, thus improving our readiness posture.

The MATE system referred to herein is embodied in a set of documents called MATE Guides. These Guides are entitled:

1. Introduction to the MATE Guides
2. MATE Acquisition Guide
3. MATE Development Guide
4. Testability Design Guide
5. Production/Operational Guide
6. Test Program Set Acquisition Guide.

MATE System Guides

Introduction to the MATE Guides. This guide provides the top-level entry point into the MATE Guides. It has been prepared to introduce the MATE system, as embodied in the MATE Guides, and to enhance the usability of the MATE Guides. It also contains an overall index for all the guides.

MATE Acquisition Guide. The MATE Acquisition Guide provides the process, procedures, and tools necessary for the acquisition and management of automatic test equipment (ATE). This guide treats the ATE acquisition process as an integral part of the weapon system acquisition process and guides the user from the formulation of the statement of need (SON) through full-scale development. The guide is the primary tool for ATE acquisition, directing the user at the appropriate point in the process to the other MATE guides.

The guide contains flow diagrams that identify functions and iterative procedures performed during the ATE acquisition process. These iterations are performed as additional or updated data becomes available, with each iteration yielding a more refined establishment and selection of cost-effective support approaches by using life-cycle-cost models to perform required trade-offs. This process is also employed for the generation of maintenance plans and the development of intermediate and depot test station configurations.

MATE Development Guide. The MATE Development Guide is the primary MATE tool for implementation of the MATE standard architecture. It provides all of the procedures, standards, specifications, and technical tools required to develop ATE systems, stations, individual test modules, and test programs. This guide provides guidance in the three major disciplines of ATE development: (1) hardware, (2) software, and (3) human factors engineering.

Testability Design Guide. Testability is the design characteristic of a unit under test (UUT) that allows determination of the UUT's operational status and, in the case of malfunction, isolation to the faulty lower-level replaceable item. The Testability Design Guide provides the procedures and technical tools required by avionic and ATE developers to produce equipment that is testable at each of the required maintenance levels. The guide defines procedures for determining the relative cost and benefits associated with avionics built-in test (BIT); identification of preferred test techniques and generic test equipment; and the design concepts, principles, and techniques for the implementation of testability features into electronic equipment.

Production/Operational Guide. The Production/Operational Guide defines the process and procedures to be utilized for the management of ATE during the production and operation phases of the weapon system life cycle. As a companion guide to the MATE Acquisition Guide, it completes the coverage of the ATE life cycle. Similarly, it directs the user at appropriate times to the Development, Test Program Set Acquisition, and Testability Guides for specific required procedures and information.

Test Program Set (TPS) Acquisition Guide. The MATE TPS Acquisition Guide provides the TPS Acquisition manager with the tools and guidance required for the successful acquisition of MATE TPS that are performance-effective, cost-effective, and supportable, within the appropriate program schedule. The guide provides a framework with all of the management and technical methods, tools, procedures, documentation, and guidance required by the Air Force to effect a successful TPS Acquisition. The framework is based on a sound definition of the TPS Life Cycle, which is cross-referenced to each phase of the weapon system life cycle. Guidance is provided for the following acquisition scenarios:

—TPSs and the weapon system are contracted for at the same time.
—TPSs are contracted for after weapon system contract award.
—TPSs are contracted for existing UUTs.
—TPSs are contracted for as a result of a major redesign in the UUTs.
—TPSs are contracted for as a result of a requirement to upgrade the performance of the TPSs.

MATE Implementation/ Institutionalization

The Commanders of Air Force Logistics Command (AFLC) and Air Force Systems Command (AFSC) have endorsed the application of the MATE system to Air Force weapon systems. Furthermore, both commanders felt the need to institutionalize MATE within the system acquisition process and support community.[2] This approach to MATE institutionalization includes the policy, control, support, and programmatic factors necessary to ensure MATE concepts are incorporated into Air Force systems and continue to evolve with changing requirements.

With this joint command direction, both a steering committee and cadre working group were established. The steering committee comprises members from HQ AFSC Deputy Chief of Staff, Acquisition Logistics (AQ AFSC/AL), and HQ AFLC Deputy Chief of Staff, Logistics Operations (HQ AFLC/LO). Its purpose is to provide guidance/direction, including overall policy and enforcement as a joint HQ AFSC/HQ AFLC responsibility, to the cadre working group; approve the cadre working group composition; and review/approve the progress of the cadre working group.

The cadre working group comprises members from each AFSC product division, AFLC Air Logistics Center, AFALD, and AGMC, and is co-chaired by Aeronautical Systems Division of AFSC and San Antonio Air Logistics Center of AFLC.

The cadre working group is charged to:

—Establish cognizance of existing Air Force ATE responsibilities and Air Force ATE and joint-service regulatory guidance; establish a basic understanding of the MATE approach to test equipment, ATS development, configuration control, and data system development and maintenance; and determine the impact of MATE on existing ATE acquisition and manage-

ment policy, and develop recommendations on necessary changes to Air Force regulatory guidance.
—Define organizational relationships, interfaces, and authority lines required within the Air Force and with other services to institutionalize MATE. This interfaces, and authority lines required ticipating and impacted organizations.
—Define/develop data systems/mechanisms/procedure changes needed to establish the MATE concept. This includes a waiver process, establishment of a MATE master plan, and identification of resources and manpower requirements.

MATE Program Status

Competitive concept definition/demonstration contracts were awarded to Westinghouse ILS Division, Hunt Valley, Md., and Sperry Systems Management, Great Neck, N.Y., in June 1978. In July 1981 the MATE full-scale-development contract was awarded to Sperry Systems Management Division. This contract requires (1) full-scale development of the MATE system, (2) first MATE system application to the development of the Intermediate Automatic Test System for the A-10 Inertial Navigation System, and (3) technical assistance to the Air Force for MATE system application to the Depot Automatic Test System for Avionics (DATSA). The DATSA contract was competitively awarded to Emerson Electronics and Space Division, Florissant, Mo., in May 1982.

Conclusion

The MATE program does improve support by making an automatic testing capability a reliable, affordable reality. This is achieved through the MATE system's tailorable business approaches, Air Force-defined and owned interfaces, standard architecture features, and accommodating personality for technological advancements. It has been said that "Sophisticated weapon systems are only effective when they are fully operational. Keeping system downtime to a minimum, therefore, is vital but increasingly difficult as weapons become more complex and competent maintenance technicians continue to be in short supply."[3]

Application of the MATE system to the development of both the prime mission equipment and its attendant support equipment will certainly enhance the support variable of our "simple" formula. This, in turn, leads to improved system support and readiness.

Notes

1. San Antonio Air Logistics Center (SA/ALC/MMT).
2. Joint AFSC/AFLC Letter, July 21, 1982.
3. Barry S. Cossel and Stephen H. Walters, "A Clear, Simple Guide to Weapon System Troubleshooting," *Defense Management Journal*, Fall Quarter 1983, p. 29. ■

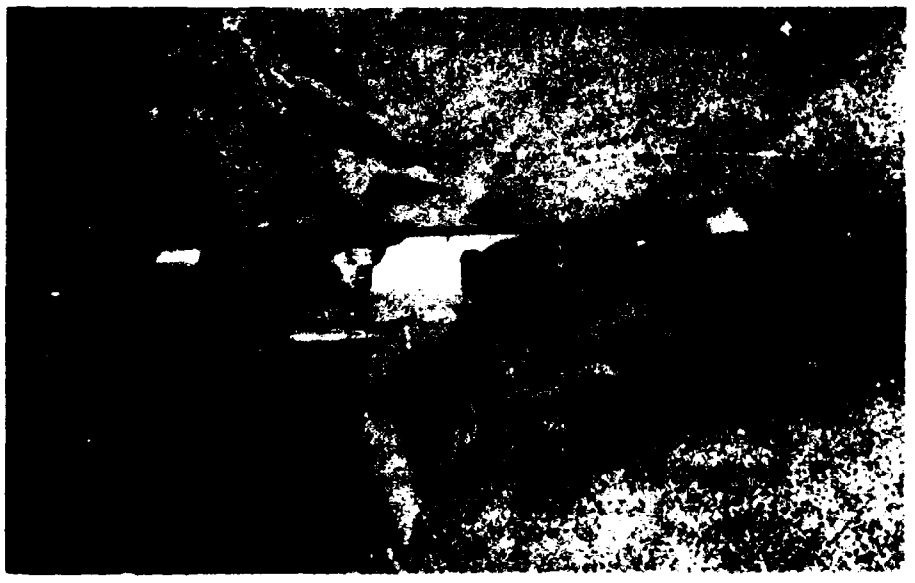
Air Force Accepts First B-1B Engine

The U.S. Air Force accepted delivery of the first production engine for the B-1B bomber on September 30.

In ceremonies at the General Electric plant in Evendale, near Cincinnati, the GE Aircraft Engine Business Group turned the F101-GE-102 engine over to Air Force Systems Command's Aeronautical Systems Division (ASD), culminating more than 13 years of research, design, development, test, and manufacturing efforts.

In remarks to the nearly 400 people attending the event, ASD Commander Lieutenant General Thomas H. McMullen called the rollout a tremendous step ahead for America. "I think we have demonstrated the F-101 to be a first-class engine from every aspect," he said.

Ned Hope, GE's general manager, F-101 Engine Projects Department, told listeners the event represents the most significant step in B-1B progress prior to rollout of the initial production aircraft in October 1984. "We have met or exceeded all our commitments to the U.S. Air Force on this engine and feel we are making an important contribution toward the realization of the on-time, on-budget goals of the entire B-1B program," he said.



Delivery of the 30,000-pound-thrust-class turbojet engine coincided with GE's receipt from the Air Force of the production verification certificate. It qualifies GE to manufacture the engine in its current design configuration and is indicative of the design maturity as well as Air Force confidence in the engine.

Others attending the event included Major General William E. Thurman, ASD's Deputy for B-1B; Harry C. Stonecipher, GE's Vice President and General Manager for Commercial and Military Transport Engine Operations; Colonel James R. Nelson, ASD's Deputy for Propulsion; and George H. Ward, General Manager for Evendale Military Engineer Projects Operations.

The swing-wing B-1B bomber is expected to enter service with the Strategic Air Command at Dyess AFB, Texas, in 1986. Plans call for 100 of the radar-evading bombers to be built in 1988. ■

Capital Investment:

What Impact Does Multiyear Procurement Really Have?

James R. Gildea, Jr.

Probably not a day goes by that we are not reminded about "poor productivity" being prevalent in the United States. Speaker after speaker and writer after writer expound on the subject, emphasize the Japanese accomplishments in the area, and actually berate the American industrial complex.

A particular whipping post of many critics is the federal government and, in particular, the Department of Defense. As weapon systems acquisition costs rise, so do the critics.

In the interest of stifling some of this criticism, in 1981 then Deputy Secretary of Defense Frank C. Carlucci proposed initiatives for improvement in weapon systems acquisition practices. Among these initiatives is the revisited concept of multiyear procurement. This paper addresses this multiyear procurement process as it relates to a key objective of stimulating industrial investment.

Multiyear contracting can generally be defined as a method to secure goods and services over a period of 2 to 5 years. The planning and program stability derived from the concept is designed to encourage a contractor to make capital investments based upon the commitment, thereby improving production and industrial base. This allows him to assess his return on investment (ROI) more accurately, and with the prospects of advancing ROI, he is willing to invest.[1]

Investment is the purchase of new productive physical assets that will, in turn, be used to produce other products. Multiyear procurement is expected to stimulate this investment in production equipment, which in turn will result in lower defects and higher quality products. As long as expected future returns on a product exceed the cost of borrowing to produce it, a firm will theoretically invest in whatever is necessary to produce that product.

The contention is that under the multiyear approach the DOD defense contractor will be stimulated to invest. However, it is equally contentious that he will want to invest in new productive capital assets based on many more factors than just the multiyear aspect. He must consider that investment dollars are a premium and, therefore, must determine the best place to use the dollars for the greatest return. For instance, he is likely to include in his analysis the financial and contractual agreements between the government and contractor.

With the multiyear approach we may pay a little more initially to get a stabilized price in the out-years.

Multiyear Investment Drivers

Material-Intensive Programs

Key points in multiyear procurement are the potential for lower production costs, shortened delivery schedules, and increased productivity. These items are principal objectives of the DOD community. The contractor goals are profit, ROI, and potentially new capital facilities for future competitive business, plus delivery of quality goods at reasonable cost.

Investment is a key point in the cost-saving objective. There is no doubt that increased investment is desirable, since it could have a broad effect on the overall "productivity" objective of defense-related industry, and of the country as a whole. Assuming the fact that it is good, what really encourages it—the overall multiyear title or a somewhat lesser-driving aspect? In investigating this aspect of the multiyear process, it is useful to highlight some of the advantages derived from it and proceed from there.

Multiyear provides for larger quantity buys of material. It is well recognized that economically large quantity buys save material costs. With the multiyear approach we may pay a little more initially to get a stabilized price in the out-years. This might be a significant case of what may be termed "material-intensive" production equipment and would result in production stability for a supplier of such material to a system or assembly house. We might see this happen where a major part of equipment is simply material content to the final and prime builder. It permits the prime to make a one-time negotiation, timely economic deliveries, and probably a competitive solicitation, and forces innovative ideas on the supplier. This leads to efficient prices and likely investment to meet the price and schedule commitment. It doesn't necessarily

■ *Mr. Gildea is Manager, Systems Projects, Automatic Test Systems, at RCA Government Systems Division-Automated Systems, at Burlington, Mass. He is a graduate of PMC 83-1, and this "think piece" was prepared in partial fulfillment of the requirements of this course.* ■

have to be a subcontract; it could also be a job center within the prime organization. Integrated circuits, glass, sensing elements, and perhaps even machined parts may be typical examples where major material content drives the final equipment. For instance, little labor is required to produce a card full of special high-cost integrated circuits or completed optical telescopes that one may need in imaging or ranging systems. Such materials may make up to 60–70 percent of the overall system. Material costs tend to be highly visible in bids, and therefore are readily visible for evaluation of large-quantity savings available. These costs should be well critiqued.

The single large-scale economic buy, coupled with the additional advantage of saving by better planning and manpower needs, significantly adds credence that this part of multiyear procurement is an investment incentive. It also may not be unreasonable to consider this the major, and possibly only, area that creates the significant cost saving in multiyear procurements. It is not without risk, however, to both prime producer and the government. Producer carrying cost for inventory can be high, thus reducing potential profit. Should the government decrease the need for the final equipment, unused material costs must be paid. In both respects the government should recognize the advantage of the large-quantity material buys and institute fully backed long-lead authorization, and inclusion of the material in cancellation ceilings, and must allow for increased profits initially to account for cost of increased inventory and borrowing interest.

In spite of the risk, material-intensive programs provide an opportunity for saving to the government and an opportunity for increased ROI to the contractor, regardless of other multiyear procurement objectives; hence, significant saving must stimulate investment.

Labor-Intensive Programs

Good planning provides the opportunity to initiate cost-saving ideas when the period of time the plan covers is long enough to implement changes to the production plan, i.e., labor learning, production engineering, and quality documentation. One of industry's most difficult problems is the simultaneous control and availability of trained manpower to be responsive to particular government requirements. In multiyear it is possible to build up, stabilize, and scale back systematically to meet overall planned program manpower requirements. This type of planning is not feasible in a series of single-year contracts, nor is a contractor willing to expend monies in the recruitment and training of personnel to perform future requirements without a specific government commitment to procure.

Emphasizing these two additional advantages of multiyear procurement, let us look at the labor-intensive side of producing equipment in reference to investment incentive. Under the labor-intensive side, more labor costs are incurred than material. Examples might be aircraft building, where much labor is utilized in assembly of the final product. In this case, we might be looking more at the system contractor's side of the house where he is in an assembly mode.

Under the multiyear contract for this type of equipment, there is the likelihood that manpower skills remain relatively stable with steady assignment to a program. With single-year procurement, such skills may be lost and hence must be replenished each year. We therefore get the case of new people and potentially high labor rates with each new buy.

One might ask, then, if a labor-intensive program can demand an investment incentive equal to that of a material-intensive program. As time goes on, in a single year industry investment in training personnel becomes enormous. In this respect, a contractor with a stable, long-range, multiyear program may be willing to invest in capital equipment or training of personnel as necessary to overcome such manpower problems. Without the long-range possibility, this investment incentive may not materialize and the contracter may want to run the risk that manpower skills will be available at economical rates when he needs them. However, even if capital equipment supplants or supplements the manpower, a significant saving to the government is not guaranteed. The contention is that even with multiyear awards, there is little stimulus to invest with manpower-intensive programs, and these programs should be evaluated for effective cost saving before embarking on multiyear contracting. Research and development programs might be considered labor-intensive programs and therefore are not conducive to effective cost saving by multiyear. Competition should be a more effective stimulant to investment.

Other Investment Drivers

There are several other key advantages to a contractor under multiyear, but these are not foreseen as investment drivers. These include administration and proposal expenses that are saved because a contractor does not have to go through procurement requests, negotiations, proposals, etc. There is, in fact, saving for both DOD and contractors, and this cost can be significant. Some of these savings to the contractor might be applied to other internal investments to improve ROI and maybe indirectly benefit government procurement, but this is not significant enough to warrant multiyear procurements.

Conclusion and Recommendation

It appears, based on this simplistic approach of judging the merits of multiyear procurement in encouraging investment, that some aspects of the multiyear accomplish what is envisioned. If a significant evaluation of the proposed programs is conducted with the goal of establishing the content of the program as being "material- or labor-" intensive, alternatives within the multiyear procurement process might be forthcoming that will highlight significant cost savings and increase the possibility of contractor investment.

The approach described should be considered as additional criteria in evaluating programs for a multiyear procurement. They should be in addition to the criteria of mature, stable, and technically sound criteria in considering programs.

One might also conclude that procurement of material in more economic quantities may be an effective DOD alternative to the overall multiyear procurement process, particularly in stable, mature, well-defined programs that can be efficiently proposed, reviewed, and initiated.■

Cited References

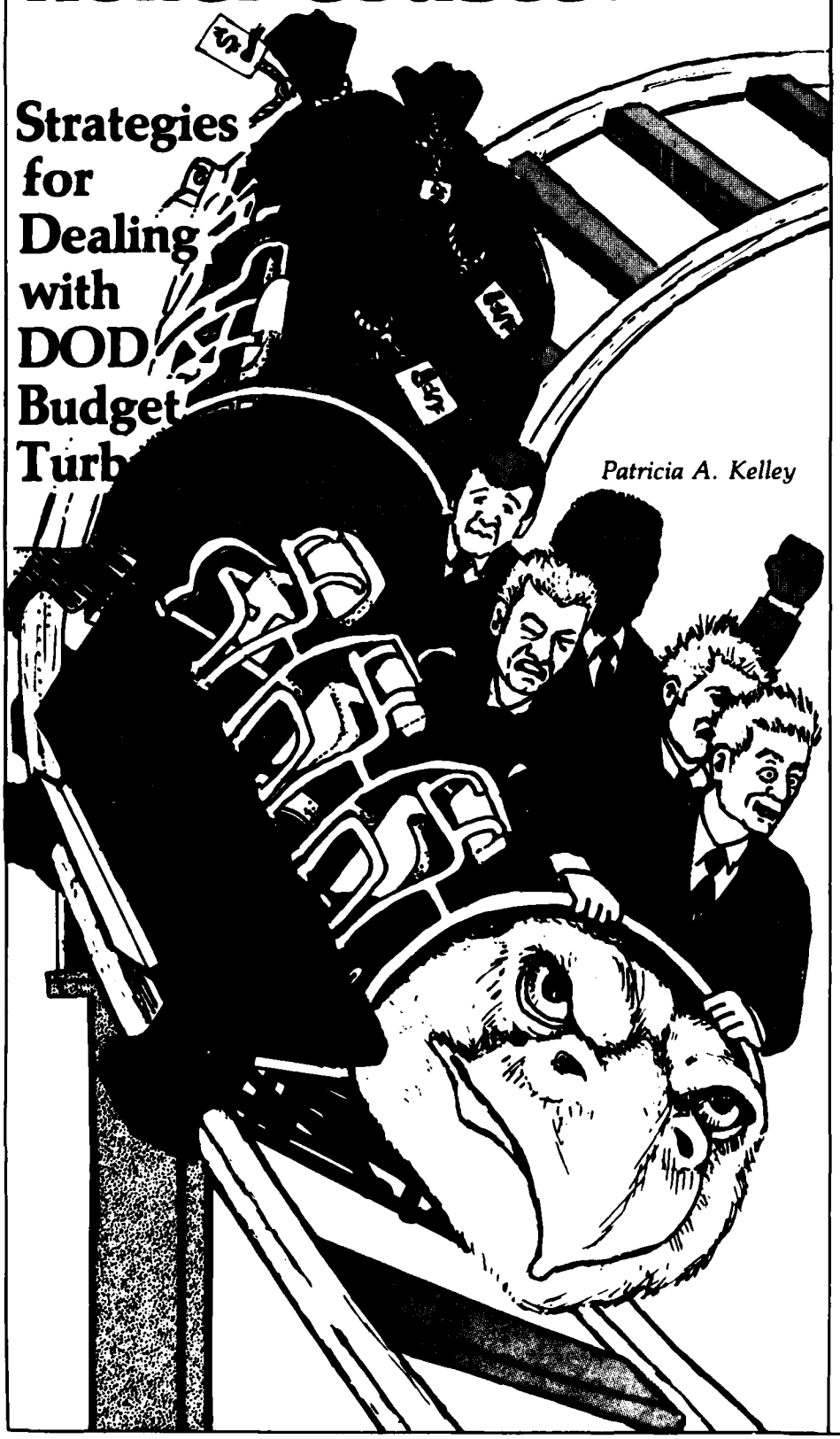
1. Captain Terry Raney, USAF, "Using Multiyear Procurement to Promote Defense Industry Investment," *Program Manager*, January-February 1983.

PROGRAM FUNDING

Riding the Budget Roller Coaster

Strategies for Dealing with DOD Budget Turb

Patricia A. Kelley



The budget of the Department of Defense is subject to a great deal of instability. This budget instability results in program instability—quantity reductions and schedule stretch-outs—which lead to program cost growth. Action 4 of the Defense Acquisition Improvement Program (AIP) recognizes this impact by emphasizing the need to increase program stability. It requires each service to place approximately 10 programs on a "stable programs list" and then budget the funds necessary to keep those programs stable.

The Defense Systems Management College sponsored a study for the derivation and analysis of strategies for dealing with budget turbulence. The year-long study was conducted by Booz-Allen & Hamilton, Inc., of Bethesda, Md. James R. Simms and Kleber S. Masterson, Jr., led the study for the contractor. I was the DSMC Contracting Officer Representative. The final report was issued in September 1983. This article summarizes that report, copies of which are available from the Defense Technical Information Center (see end of article).

Budget instability or turbulence is a significant factor in weapon system acquisition. This study looked at the overall government budget, the DOD budget, and the budgets of the various appropriation accounts within the DOD budget. In the study, the terms "topline budget turbulence" and "topline planning turbulence" are used. Topline *budget* turbulence is the annual variation about the long-term mean level of funding actually appropriated by Congress. Year-to-year variations in the DOD appropriation accounts are also considered to be topline budget turbulence. This turbulence can be caused by the normal political process, by the priority and budgeting processes within DOD, and by unanticipated cost growth. Program stability can also be affected by changing funding levels in the planning reflected in the DOD Five Year Defense Plan (FYDP). These "out-year" changes in the DOD planning resource levels, the FYDP, are called topline *planning* turbulence.

Analysis of budget data from FY 64 to FY 81 reveals that the DOD procurement account is approximately twice as turbulent as the DOD total obligation authority (TDA) and the next most turbulent account, operation and maintenance (O&M). Analysis shows that the

standard deviation of the annual percent change for procurement is approximately 15 percent compared to approximately 8 percent for the total DOD TOA and the O&M account. The procurement account appears to be the "discretionary account" and therefore takes the brunt of budget turbulence.

An analysis was also performed to determine the transmission of turbulence from one budget level to another. The transmission of gross national product (GNP) turbulence to the various budget levels was analyzed. This analysis consisted of correlating the turbulence at one budget level with the turbulence to other procurement budget levels. The results of correlating the year-to-year percentage change in economic and budget data with other budget data are shown below.

Small values for the coefficient of correlation between any two categories indicate that there was no significant correlation between them for the 1964–81 time period. On the other hand, a large value indicates a higher degree of correlation. For example, the data indicate a strong correlation (.94) between the total DOD budget and the procurement account.

The results of this analysis are rather surprising when compared to the "conventional wisdom" that:

—GNP turbulence does not correlate with the federal budget, the DOD budget, the procurement budget, or any of the procurement accounts.
—Federal budget turbulence has very little correlation with the total DOD budget or any of its procurement accounts.
—There is a high correlation between the total DOD budget and the procurement budget; however, there is not a high correlation between the procurement budget and all of the various accounts from which it is aggregated.

In general, turbulence above the DOD budget need not be considered when deriving and analyzing strategies to deal with the budget turbulence.

The major causes of topline budget turbulence were no surprise. Wars cause the greatest turbulence, followed by changes of administration. Congressional actions are a significant source of program-specific turbulence, but not as large a contributor to topline budget turbulence. Turbulence in the GNP or the total federal budget is not directly transmitted to the defense budget or to procurement. The analysis also revealed that, at the macro level, increases in the threat have not led to immediate changes in the budget or in topline budget turbulence.

The literature is not clear on the current DOD processes for coping with in-

Congressional actions are a significant source of program-specific turbulence, but not as large a contributor to topline budget turbulence.

stability or turbulence; however, the Booz-Allen & Hamilton analysis indicates that the following strategies are being used to cope with topline budget and planning turbulence:

—Reducing cost growth by improved cost estimates, improved cost control, and more realistic inflation estimates;
—Acquiring a mix of systems appropriate for less-than-FYDP level of funding via prioritization (principally at the service level with DOD-wide direction and constraints) and affordability tests for new programs;
—Providing extra protection for top-priority programs via stable program lists and multiyear contracting;
—Stretching-out/speeding-up programs;
—Stopping and restarting programs on the margin; and
—Taking actions at the program level to minimize negative impacts of turbulence.

In the study, three competitive (mutually exclusive) strategies—complete fencing, even distribution, and hybrid—were evaluated and compared to the three competitive elements of the current process—extra protection, stretching-out/speeding-up, and stopping/restarting.

Complete fencing and stopping/restarting are considered politically nonviable as mechanisms for coping with turbulence. However, if the costs of stopping and restarting were low and the economic benefits of greater program stability for fenced programs were high, then some variants involving stopping and restarting programs might be attractive. The analysis showed generally small differences in the relative costs of the other strategies, with the costs favoring strategies with fencing if programs have steep cost-quantity relationships, and favoring even distribution if the programs are near their maximum economical production rates. If the economic benefits are very great, however, the hybrid strategy, where some programs are fenced, and the extra-protection strategy may be significantly less costly for some cases. Negligible differences (less than 1 percent) were found in discounted mission effectiveness over time if the same number of systems is ultimately built. This is the case because effectiveness over the long life of today's systems dominates differences in short-term effectiveness during the production period. As a result, it was concluded that these competitive strategies must be evaluated on a case-by-case basis with program-specific cost data.

The recommendations made by Booz-Allen & Hamilton include what to do with marginal programs, which current strategies to continue, improvements to current processes, and possible future studies. They recommend that marginal programs be stopped or started only if that action is

(continued on page 70)

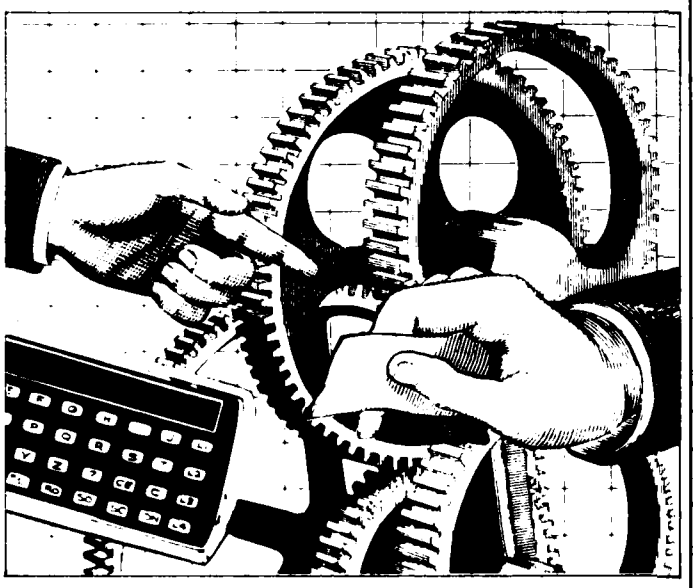
■*Ms. Kelley is a Professor of Acquisition/Systems Management in the Research Directorate at DSMC.*■

Acquisition Research Symposium Abstracts

A brief look at some of the papers presented at the 1983 Federal Acquisition Research Symposium

The U.S. Air Force hosted the 1983 Federal Acquisition Research Symposium for the Department of Defense and the Office of Federal Procurement Policy at Williamsburg, Va., December 7-9. The theme was "Government, Industry, Academe: Synergism for Acquisition Improvement."

Abstracts of about 100 of the papers presented at the symposium are reproduced below, categorized by subject area. If you are interested in obtaining a copy of the Proceedings *of the 1983 Federal Acquisition Research Symposium, you may query the Defense Technical Information Center (DTIC), Cameron Station, Alexandria, Va. 22314, phone (703) 274-7633 or Autovon 284-7633, or the Defense Logistics Studies Information Exchange (DLSIE), U.S. Army Logistics Management Center, Fort Lee, Va. 23801, phone (804) 734-3130 or Autovon 687-3130, after December 15.*



ACQUISITION AUTOMATION

"The Microcomputer in the Acquisition Environment" by Major Maurice Ecung, USAF

Headquarters Space Division, Los Angeles, took the initiative in adopting the microcomputer as a viable tool to improve overall operations. After a little better than 18 months there are over 200 terminals on station. Most are split between four- and eight-user multiprocessor systems.

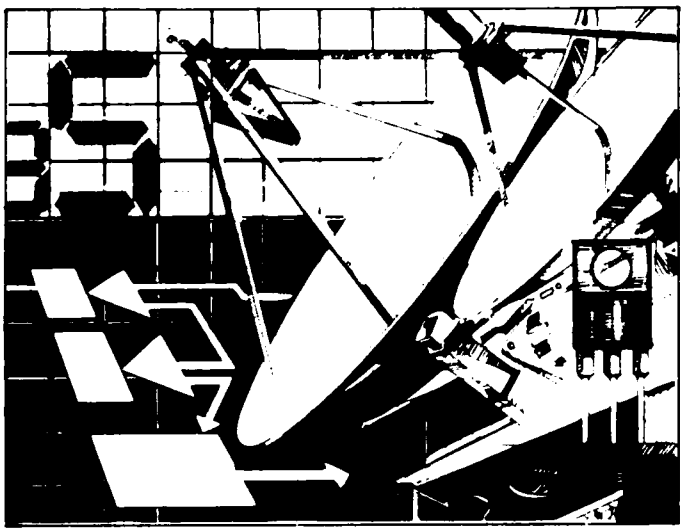
Our primary goal in both microcomputer hardware and software acquisition is to stay away from proprietary products that can lock the user into a particular vendor for systems support and modification. The result of our November 1981 design decision was hardware configured around the Z80 microprocessor using the S-100 (IEEE-696) Bus. Standardized user interface was included by specifying a keyboard configuration of NASA's Jet Propulsion Laboratory design with 40 programmable function keys. Eight-inch single-side, single-density floppy-disk drives (IBM format 3740) were chosen because they represent the one industry-wide standard in disk formatting.

Though most of this work was done in a contracting office, the conclusions are relevant to all. We feel the experience of our period of experimentation with office automation can aid other offices considering taking this course of action. We have had both positive and negative results with our effort, but the overall conclusion is that (1) microcomputer office automation cannot be avoided, and (2) we have only scratched the surface of its applications in the acquisition environment.

"Paperless Solicitation and Contracting" by George T. Nickolas

This paper examines the contract simplification effort currently undergoing prototype development in the services under the Defense Acquisition Improvement Program. This effort has led the author to explore the state of the art of contracting, and what changes will have to be made to methods of contracting to keep pace with the commercial marketplace in the next decade.

Further, the computer is becoming as common as the telephone in every office. This paper provides what the author perceives as a step-by-step advancement needed by the government in the use of computers to transition from formal paper contracts transported by mail to paperless contracting transmitted via telephone lines or satellite to contractors, and between contractor and government agencies. This paper explains the author's concept of the various elements of paperless contract evolution that must be achieved to allow the release of solicitations via computers, contractor submission of bids via computers, and the eventual award of contractors via computers.



ACQUISITION INFORMATION MANAGEMENT

"Mechanized Contract Document Preparation and Abstract System" by Thomas L. Bono

We have developed a system that revolutionizes contract document preparation by taking advantage of state-of-the-art technology in combining the functions of word processing (WP) and data processing (DP). This system has been proved effective in reducing document preparation time, in producing a better quality document, and in reducing document errors. The system simultaneously captures data to be abstracted and fed into a Management Information System (MIS) ensuring that the contract document and abstracted data in the MIS are identical. Since contract documents are mostly text, the WP capability was most important, yet the abstract of specific information could not be accurately and efficiently captured in WP mode. To streamline the data-capture portion of the system for abstracting, DP was needed. To produce a finished product containing both the text and abstracted data, WP and DP had to be efficiently integrated. Through complex software development, we supplemented the vendor software to build a successful prototype system that is undergoing acceptance testing. The system is in its infancy, but it has taken great strides in increasing the efficiency of contractual document preparation and abstracting. Yet to come is distributed processing of edit and validation routines currently being accomplished on the mainframe computer.

"The Acquisition Management Information System—Friend or Foe?" by Captain Curtis R. Cook, USAF

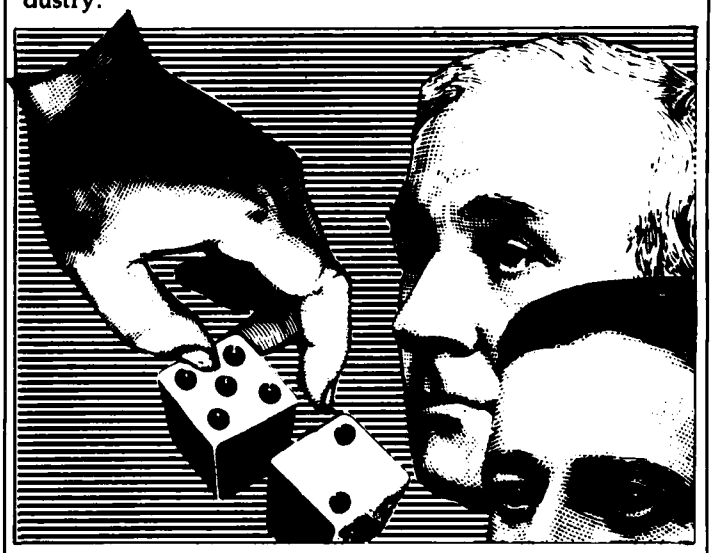
The AFSC Acquisition Management Information System (AMIS) is a complex, extensive computer system containing detailed information on more than 61,000 contracts. This paper describes the history and development of AMIS, plus recent actions taken by the Directorate of Contract Data Systems to improve system user-friendliness.

A survey of field activities revealed several unsatisfied user needs, especially in data input/output. The Distributed Processing for Contractual Input (DPCI) system was designed and programmed to fill some of these needs. The genesis and growth of DPCI is treated, including software design and hardware acquisition. The paper covers a fundamental change in management philosophy—expanded participation of system users in establishing and prioritizing system development and change. A new AMIS Users Group was established to advance the effective use of AMIS through the interchange of information concerning system design, use, operation, and maintenance. More emphasis is being placed on improving data base accuracy and completeness, and management education has been stressed. The paper explains steps taken in these and other areas and comments on future system changes to further enhance user-friendliness.

"Consolidation of DOD Bidder's Mailing List Application" by Elizabeth Parsons

This paper describes a need to streamline the processing of Bidder's Mailing List (BML) Applications, Standard Form 129, as supplemented and, at the same time, takes the first step toward modernizing an important element in our acquisition process. History has shown that wars are lost because of the lack of supplies in the right place at the right time. With today's modern weapons systems, flight faster than sound, capability to land on the moon and return to earth, and other spectacular accomplishments, it would be negligent not to concentrate also on our ability to support these systems with rapidity and effectiveness.

The consolidation of the BML applications to one or more locations would be cost-effective for government and industry.



ACQUISITION RISK AND UNCERTAINTY

"Cost Risk Trade-Offs in Timing the Production Decision" by John M. Cockerham

The question before every development and acquisition program is: When should production resources be committed? The actual decision to enter production is normally assumed to be the same point in time where the expenditure of production monies is authorized or initiated. This assumption is challenged through the analysis of the total cost risk of the combined RDT&E and production programs vs. time.

Consideration is given to technical risk, program termination liabilities, RDT&E spending rates, production spend rates, cost of program stretch-out, production lead times and return on investment. The purpose is to present and explore the primary financial factors and interrelationships to determine the optimum time to expend production monies independent of the final production decision. The methods and principles are demonstrated by an example derived from an actual application on a major weapon system.

"Managing Program Risk: One Way to Reduce Cost Growth" by Captain Lee Cooper, USAF

Former Deputy Secretary of Defense Frank C. Carlucci, in his April 30, 1981, memorandum on "Improving the Acquisition Process," recognized that the key to reducing program costs is to establish and maintain a stable program. One of his initiatives requires the services to "budget to most likely or expected costs, including predictable cost increases due to risk"; and to "provide incentives for acquisition officers and industry to make and use realistic cost estimates."

This paper focuses on how the program manager can reduce cost growth through a risk management program that provides a more complete assessment of program risks. The essential elements of a risk management program, a proposed approach to implementing the program, and the advantages associated with successful implementation on major weapon systems acquisitions are outlined.

The OSD has demonstrated a commitment to reducing cost growth. Success, however, will require the program managers to establish a risk management program that forces consideration of all program risks before they occur.

"Decision Technology: The Catalyst for Acquisition Improvement" by Roland P. Swank and Henry M. Wales

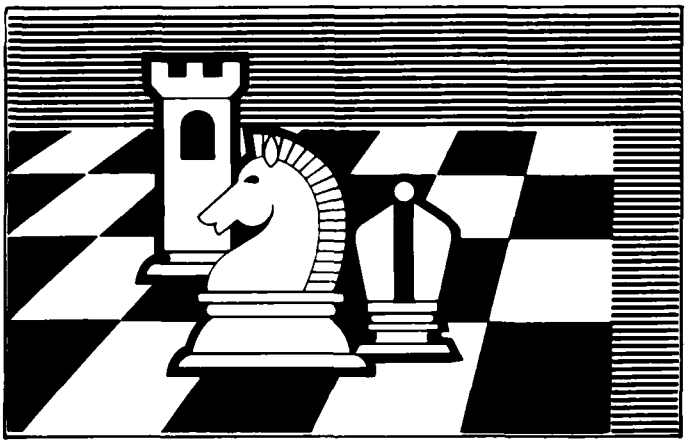
It is possible to manage all activities in a weapon acquisition with a system that predicts and achieves desired results.

Decision technology provides the program manager with the exact information he needs to synthesize all program elements to accurately predict performance probability without compromising management style or objectives. It embraces a basic language that simplifies understanding and communication, and applies a fundamental logic that clarifies the implications of each management action. It presents the risk and consequence visibility in a format that enables the program manager to make necessary decisions and confidently defend them, knowing they will achieve the results expected. Therefore, all the weapon systems expectations are precisely known at all times.

Decision technology applied in over 70 applications has resulted in significant savings in cost and time, along with achievement of predictable outcomes.

"Designing the Equitable Risk Contract" by Dr. Robert F. Williams

Department of Defense contracting faces such great uncertainty that contracts must be designed to share the resultant risk. This paper describes the steps for this risk-sharing: assessing sources of uncertainty and their probability of impact, assessing the impact of their uncertainties on both contractual partners' objectives, combining these impacts for total risk to the objectives, prioritizing the parties' objectives, arraying the two sets of prioritized risk in order to equate them, and selecting the proper contractual devices to bring on this equity. The paper suggests what research might be done on (1) assessing the impact of uncertainties on contractual objectives, (2) developing operations research models to optimize risk sharing, (3) the impact of contractual devices on objectives, and (4) the design of experiments to effect this research.



ACQUISITION STRATEGY

"A Case History of the Cost-Benefit Analysis of the Proposed Uniform Federal Procurement System" by Kenneth H. Borchers, Joseph L. Hood, and Earl H. Langenbeck

Public Law 96-83 directed the Office of Federal Procurement Policy to develop and propose a uniform procurement system for use by federal agencies without regard to current barriers or statutory requirements. The proposal was to include projected costs and benefits of the proposed system. Two constraints influenced the approach to meet this statutory requirement. The methodology was an adaptation of the Analytic Hierarchy Process, which rigorously uses expert judgments of those knowledgeable of procurement systems from both the public and private sectors. A synthesis of the findings from the primary and secondary data analyses estimated net annual savings ranging from $2 billion to $9 billion.

"Assumption of Risk in the R&D Environment" by James H. Gill

There has been a traditional philosophy regarding the use of different types of contracts to share risk during the development of a major weapon system. This philosophy would have the government assume the burden of risk early in the life of the system through the use of cost-type contracts. As the requirement becomes more defined, the burden of risk is gradually transferred to the contractor with a commensurate increase in potential profit.

In all too many cases we have witnessed the abuse of this concept and the resultant overrunning of scheduled targets. A residual of this practice has been the almost total lack of

credibility between Congress and the Defense Department when negotiating a FY budget. The Ballistic Missile Office has dramatically altered the traditional concept of assumption of risk by offering contractors the opportunity to take their fate into their own hands and assume a major share of the cost risk, while simultaneously reducing the risk associated with technical failure.

"An Analysis of the Acquisition Strategy Decision Process Along Three Dimensions of the Acquisition Improvement Program" by Holly A. Heinz

This study investigates the acquisition strategy decision process as it relates to the major themes of the Acquisition Improvement Program. Further, it examines a wide spectrum of acquisition strategy variables that draw on management, program, contracting, and industry considerations.

Findings support the notion that a program's effect on the industrial base, readiness/sustainability, and cost can be predetermined from a specific number of program factors. Further, their effects can be enhanced or otherwise altered by a few, key acquisition strategies (AS) approaches/factors. The findings suggest that programs with limited competition at the subsystem level fare better than those predicted on the extremes of either open competition with component breakout, or restricted to a sole source at the systems level; that a moderate, middle-of-the-road AS approach is more effective for most programs.

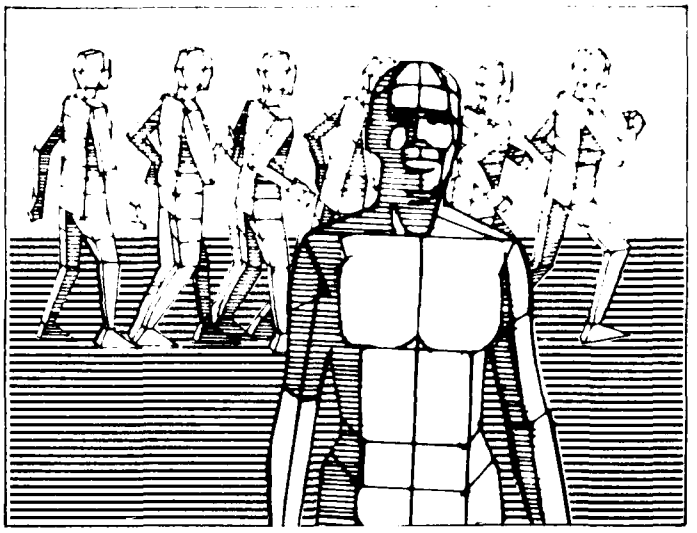
"Skunkworks 81 Revisited—An Update on Acquisition Strategy" by Lieutenant Colonel John E. Longhouser, USA

A paper on competitive prototyping was presented by William Stansberry, Deputy Product Manager for Armor Training Devices, at the Interservice Industry Conference in December 1981. That paper coined the phrase "Skunkworks 81," meaning a combination of the Skunkworks applied to earlier Air Force projects and competitive prototyping in full-scale development. The paper accurately reported the Conduct of Fire Trainer (COFT) development at that time. The promulgation of the DOD Acquisition Initiatives, and the emphasis on streamlining the acquisition cycle provide reason for this updating of "Skunkworks 81." The author assesses the results of the COFT application of competitive prototyping, and discusses the impact this acquisition strategy has had on transition from development to production for the largest procurement of a training simulator ever negotiated.

ACQUISITION WORK FORCE

"Assessing Contracting Work Force Requirements in the Matrixed Organization" by Albert J. Goebel, Conrad W. Kipp, and Major Richard M. See, USAF

The Aeronautical Systems Division (ASD), Deputy for Contracting and Manufacturing, Air Force Systems Command, believes our most critical resource to be people. How we allocate this work force becomes a primary ingredient to the success of our mission. The purpose of this paper is to explain how contracting personnel are managed and allocated within our matrix organization. We intend to show how we started; our growing pains in developing a model for evaluating workload; the results of our efforts; and our plans for future improvements.



Matrixing can be defined as the concept of classifying and assigning skills by functional area and the collocation of personnel with these skills from a central home office to support specific program/project organizations. ASD implemented the matrixing of engineering personnel in support of its acquisition programs in 1964.

"Closing the Gap Between R&D and Application in Academe to Better Support Government and Industry" by Yvonne F. Howerton

To successfully accomplish the goals implicit in defense research and development (R&D), the interrelationship of government, industry, and academe deserves increased attention.

While the relationship between government and industry has been firmly established, it is in the academic arena that a better clarity of direction regarding the pursuit of research and development is needed. Until most recently the emphasis on scientific training was not a major priority in the secondary schools and universities. Only recently has attention been drawn to the increasing technological advances and shortage of qualified personnel. With the assistance of funds from the government, industry, and private foundations, an emphasis on scientific training has taken on a new emphasis.

"The Leader of the Army Acquisition Work Force" by Gerald B. Kipp

Who is the leader in the Army acquisition work force? Most of us involved in any federal procurement process know that individual is the contracting officer (KO). In this article, the author summarizes how the Defense Acquisition Regulation and the Army Procurement Procedure define a KO, how he is selected, required qualifications, and major responsibilities. He points out a number of weaknesses he sees in the present system, makes personal recommendations for improvement, and synopsizes the benefits that can result from the overall upgrading of the KO position.

"Prerequisites for the Establishment of a Professional Acquisition Work Force" by John D. Krieger

Government, industry, and academe can make and are making great strides toward establishing a professional acquisition work force. Prerequisite to achieving that goal is that each component do everything it can individually, as well as collectively. Presently, there are tremendous barriers to establishing a professional work force and an additional danger of losing ground already gained. Too much is made of some gains that, on the surface, appear significant. However, by working together the goal of a professional work force can be achieved, but failing to work together will keep it beyond grasp.

"Training Requirements for Changing Times" by George T. Nickolas

Federal managers in the procurement career series have become concerned that there appears to be a need to increase the skill level in the career field. The Office of Personnel Management has demonstrated a perception of the procurement career field as less professional and more administrative in nature by their efforts in revising the job standards. This perception and current events highlight the subject matter of this paper. The author utilizes data researched from the Federal Acquisition Institute on the educational level of the government procurement careerist to arrive at his conclusions. The statistical data is supplemented by discussions during recent National Contract Management Association meetings and symposiums.

"A Dynamic Personnel Assignment Model in the R&D Environment" by Dr. Patrick J. Sweeney

This computer simulation captures the contributions of inexperienced and experienced personnel to overall effectiveness in a typical research and development organization.

The model is appropriately responsive to changes in experience level, System Program Office (SPO) leadership, priority, funding, and other factors. Given a fixed number of total personnel authorizations and fixed percentage of inexperienced personnel, the model indicates that assigning the inexperienced to the lower priority SPOs results in a maximum organizational measure of effectiveness (MOE). It also shows that an assignment policy based upon both priority and funding level may have only small impact upon this high MOE. Similarly, assigning all of the inexperienced to the high-priority SPOs results in a relatively low MOE. Improving the SPO leadership increases the value of the MOE, but cannot compensate for high percentages of inexperience. The model can also be used to assign SPO leaders.

"Training Acquisition Personnel Through a Local College" by Eugene R. Watters and Harley A. Main

There are two important keys to effective and cost-conscious acquisition of goods and services for the Air Force: the first is a work force trained in current acquisition skills; the second is a reservoir of qualified people for entry into the acquisition career field.

To enlarge the pool of qualified people and to provide training opportunities for people in the career field, our directorate initiated action to establish an associate degree program in purchasing and contracting at Oscar Rose Junior College. A number of our people, both clerical and professional, are now attending classes offered through this program.

BALANCING GOVERNMENT AND INDUSTRY INTERACTIONS

"Cost Accounting Standards, a Time for Government and Industry Action" by Patrick D. Sullivan

From its inception in 1970, the Cost Accounting Standards Board (CAS Board) was the subject of considerable controversy. Among the issues was the vesting of the function of establishing cost accounting standards in a board, independent of the executive branch, since those functions are the responsibility of the executive branch. In addition, the law required the Board to report to the Congress the probable costs and benefits of the Standards. This was never done.

In September 1980, Congress declined to continue funding of the Board and it ceased operations. But the 19 Standards promulgated by the Board continue today as a part of the law. Consequently, government and industry alike have found themselves without an authoritative body to interpret the Standards and issue corrections, exemptions, and waivers.

At least two of the Standards, CAS 409, Depreciation of Tangible Capital Assets, and CAS 414, Cost of Money as an Element of Facilities Capital, are claimed to be having a negative effect on the nation's industrial base. They have also been the subject of considerable congressional interest because of DOD actions to recognize more rapid depreciation of assets. Inherent in these issues is the need to find a sponsor for the Standards so that appropriate action can be taken on these as well as other questions. This paper examines the history of the Board, some of the current problems, and discusses several of the alternatives that are available at this time for dealing with the situation created by the demise of the Cost Accounting Standards Board.

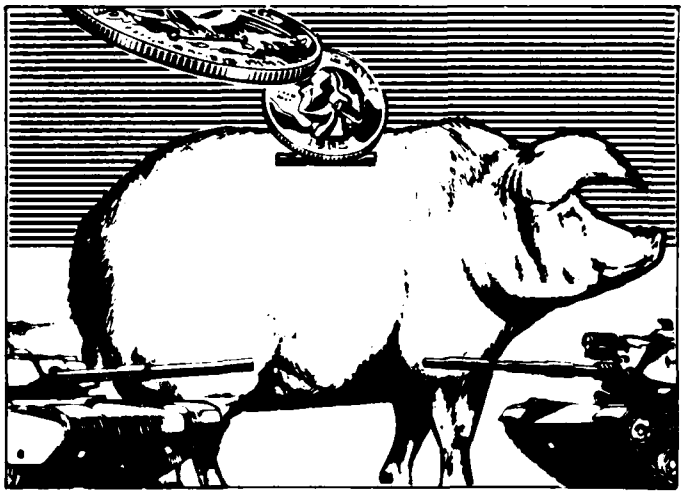
"Government-Contractor Interaction" by David M. Thomas

The development of the Administrative Contracting Officer represents an advance in the government system of contract management because it provides an individual with knowledge, time, and a specialized function to ensure performance of government contracts. However, the development has created a dichotomy between the award and the post-award function, which increases the adversary relationship with government contractors. This paper advocates that this adversarial relationship can be decreased if PCOs and ACOs are provided with opportunities to serve in the assignments of the other.

"Needed Help for the Federal Acquisition Regulations Council" by Charles D. Woodruff

Writing and maintaining the FAR regulation will be a tough job, as it has been with the DAR. The subjects covered will be complex and technical. All capabilities should be brought to bear to achieve regulations that are fair, can be administered economically, and can effectively accomplish their purposes.

Discussion of a few aspects of DAR 1-324 Warranties and DAR 1-330 Contractor Liability for Damage to Government Property, and the related contract clauses, shows the two coverages to be deficient. There is a need particularly in the writing of regulations. The experience and expertise of industry personnel should supplement that of government personnel, who will be rotated into and out of the FAR Council. A document with the impact the FAR will have deserves full use of available talent.



CAPITAL INVESTMENT INITIATIVES

"Analysis of Incentives for Productivity—Enhancing Investment" by Geneese Gottschalk, Myron G. Myers, and Michael J. Konvalinka

There is evidence that government contractors perform production contracts using high-cost methods leading to higher than necessary prices to the government. Capital investments that lower total cost performance are discouraged, or at least not encouraged, by current policies and market environment.

This paper describes a model of contractor investment behavior within existing DOD contracting principles. A preference for investments that confer low rates of productivity gain is shown to exist. A discounted cash flow investment analysis model is used to explore correctives to current policies, including increased weight on facilities capital employed in DOD profit policy, sharing of cost savings, and investment incentives like accelerated depreciation. The payoff to the government and DOD, if each corrective were adopted, is explored.

"The Industrial Modernization Incentives Program: An Experimental Effort to Improve Defense Contractor Productivity" by A. Douglas Reeves

This paper concentrates on the philosophy and concepts behind the current test of the Industrial Modernization Incentives Program (IMIP). We see how the test has been structured and applications to date. The test program is still in the early stages and there are many more questions than answers. The aspects requiring further analysis are explored in detail. The paper ties together areas that relate to the IMIP and encompass the total environment motivating contractor productivity improvement efforts. These include Weighted Guidelines, Cost Accounting Standards, employee productivity incentive and bonus systems, multiyear procurement, economic production rates, the source selection process, and manufacturing technology.

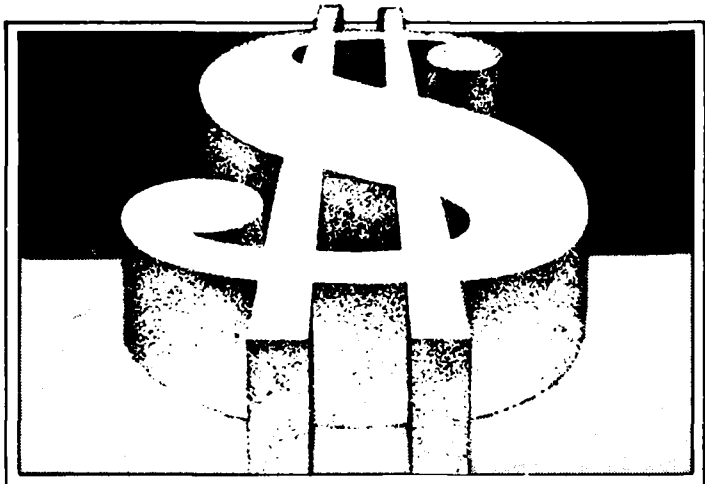
"The Government Relationship to Industry in Technology Transfer and Development" by David H. Swanson

The Iowa State University Center for Industrial Research and Service conducted a survey of manufacturers in January 1982. This mail survey to the 3,764 manufacturers in Iowa was designed to reveal the problem areas and information needs of manufacturers and processors. The survey also addressed information sources, technology development, productivity improvement, and how managers expected to improve operations. The role of government, government laboratories, universities, equipment manufacturers, and trade associations in technology transfer and development was delineated in the analysis.

COMPETITION

"Competitive Procurements: The Synergistic Linkage Among Government, Industry, and Academe" by Captain Donald L. Brechtel, USAF, Edward J. Brost, and Captain Steven J. Zamparelli, USAF

Competition is looked upon by many as one technique to maximize the return from the procurement dollars available. Many members of Congress recommend the competitive method of purchasing for most government procurement actions. However, the history of federal procurement attests to the fact that competitive bidding is inadequate in some situations. Since competitive procurement does not always result in lower prices, program managers, contracting officers, and buyers should understand the conditions that may affect prices, and aggressively seek competition for items that may result in net savings to the government.



This paper includes a summary of competition theory and recent research conducted in the area of competition by graduate students at the Air Force Institute of Technology. Two graduate research projects that addressed competition for weapon system replenishment spare parts are summarized in the paper.

"Competition: An Integral Part of the Acquisition Process" by Lieutenant Colonel Roger C. Head, USAF

The concept of competition for defense acquisition is one that requires careful examination and discussion in today's cost-conscious environment. The Office of Management and Budget Circular A-109 directs each government agency to ". . . depend on, whenever economically beneficial, competition between similar or differing system concepts throughout the acquisition process." This direction leads to the current high-level attention that competition is receiving today. Competition is being examined as a major factor in cost control for weapon system procurement for the entire acquisition process. The need for complete preplanning and market research to promote effective competition is apparent when past procurement efforts are examined. Preplanning and market research in the early stages of the acquisition process are areas that need active management support.

"Increasing Spares Competition in AFLC" by Thomas M. McCann and James R. Butterworth

This paper describes the results of a research effort sponsored by the Air Force Business Research Management Center at Wright-Patterson Air Force Base. The focus was on the identification of the impediments to competitive spares acquisition, and definition of actions that can be taken to improve the capability of the Air Force to achieve competition on spare parts. The effort included an extensive search of the literature and field visits to Air Logistics Centers involved with the purchase of spare parts. The research was structured around analysis of the impact of the Procurement Method Code on the competitive activities.

The results comprise recommendations covering systemic changes in the initial system acquisition process, and in the procedures used at the Air Logistics Centers in item screening and contracting. These should provide the capability to improve the degree of attained competition for Air Force spare parts.

CONTRACTING METHODS

"Award-Fee Contract Provisions as a Program Management Tool" by Major Richard F. DeMong

Award-fee contract provisions can be used as a program management tool. Award-fee contracts have been found to be a cost-effective means of encouraging contractors to surpass the specifications of the contract. Award-fee contracting can be successfully used in the dynamic environment of R&D programs, as well as full-scale-development programs. Award-fee contracting relies on other forms of motivation than just the profit motive. The frequent evaluations used in award-fee contracting give the contractor (including managers and employees) timely feedback on its performance. These evaluations implicitly tell the contractor what the government's priorities are. This evaluation process also enables the government to better define its requirements. It serves as a motivation tool in that the managers will strive to make the evaluation look as good as possible. Timely and high-level government involvement have been found to be important in the success of award-fee contracting.

"Nailing Down the Liability Issue Once and for All" by Dr. William C. Pursch

This paper contrasts the present Defense Acquisition Regulation requirements for liability determinations for loss, damage, or destruction of government property in the hands of contractors, with new guidance in the Federal Acquisition Regulation for property administrators and administrative contracting officers. Discussion includes the cumbersome method of shifting the liability for loss, damage, or destruction of government property by disapproving the contractor's property control system, and the liability clauses used in government contracts. The rationale behind the government's position as a self-insurer is presented, along with the procedure to follow in making liability decisions. Certain conclusions are drawn with respect to strengthening the function of the property administrator, and the need for the support of the administrative contracting officer.

"Does the Prompt Payment Act Insure Timely Contract Payment?" by Michael E. Wilson

On May 21, 1982, President Reagan signed Public Law 97-177, the Prompt Payment Act, which has an objective of

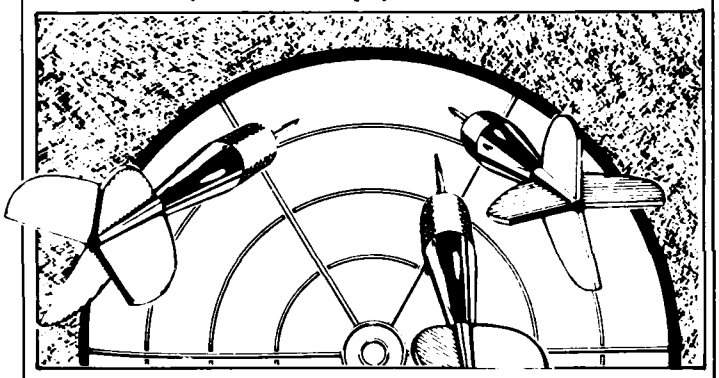
timely contract payment. Since the act was implemented nearly 1 year ago, the question is: Does the Prompt Payment Act insure timely contract payment?

What is timely contract payment? There is no established standard for timeliness in which both government and industry agree. When contractor expectations about contract payment timeliness exceed Contract Payment Activity performance, complaints about untimely payments occur.

How has the Prompt Payment Act impacted the timeliness of contract payments? The provisions of the Prompt Payment Act can and, when followed, do improve the timeliness of contract payments; however, given the contract payment process followed, the delays inherent in it and accidental to it, timely contract payment cannot be insured by the Act alone.

What strategy should be followed to insure timely contract payment? A win-win strategy should be followed by government and industry.

What should this strategy include? It should include both short-term and long-term actions, which attack the root causes of delays in contract payments.



CONTRACTING STRATEGY

"Increasing the Contractor/Subcontractor/Vendor Bidding Lists" by John G. Beverly, Frank J. Bonello, James Daschbach, and William I. Davisson

Traditionally, the Department of Defense (DOD) has not involved itself directly in the subcontractor selection process required by any prime contract. Rather, the process of selection of subcontractors as well as the "make-or-buy" decision is basically left to the prime contractor. Except for the identification of *critical* components (by subcontractor), the prime contractor is not required to report any information regarding subcontracts or subcontractors. Further, the rules that DOD uses for dealing with prime contractors may not be the same rules used by the prime contractors in dealing with subcontractors.

For whatever reason, the subcontractors available in the defense industrial base appear to be diminishing over time. The authors' intent is to demonstrate a method by which DOD (the Air Force) can increase the defense industrial base by increasing the list of companies that could bid on DOD vendor contracts, as well as be available to bid on contracts from prime contractors. Our focus will be on small private business, although the technique shown here could be applied to existing data bases available for the establishments of SEC-registered corporations.

"Multiyear Procurement: A "Team Approach" by Harvey S. Fromer and John L. Sweeney

Although the multiyear concept has been on the scene for many years, the associated regulations (e.g., DAR 1-322) had severely limited its application to major acquisition programs. The prominence of multiyear procurement in the Department of Defense Acquisition Improvement Program (Initiative No. 3), coupled with the alterations included in the fiscal 1982 Defense Authorization Act, signaled a serious attempt by the government to make multiyear procurement a viable acquisition strategy for major defense procurements.

The specific example of the Navy C-2A aircraft reprocurement demonstrates that the successful application of multiyear to major systems acquisitions requires a team effort by government, the prime contractor and his subcontractors. Multiyear procurement, the 1980 version, is providing all the benefits of a bigger bang for the defense dollar while improving the defense industrial base, filling idle capacity, and putting people back to work.

"Cost Risk and Contract Type: A Normative Model" by Richard L. Murphy

This article presents a model that describes the relationships among the cost risk inherent in a particular procurement situation, the degree to which that cost risk is shared between the government and the contractor, and the risk premium awarded to the contractor for assuming his share of the cost risk. The model is normative in that it provides a framework for analyzing the possible combinations of risk assumption on the part of the government, and risk premiums that are logically consistent. The model requires that the price analyst estimate the cost of contract performance, the general shape of the distribution of probable costs, and the standard deviation of that distribution. In addition, a policy decision is required concerning what constitutes a reasonable probability that the contractor would incur a loss.

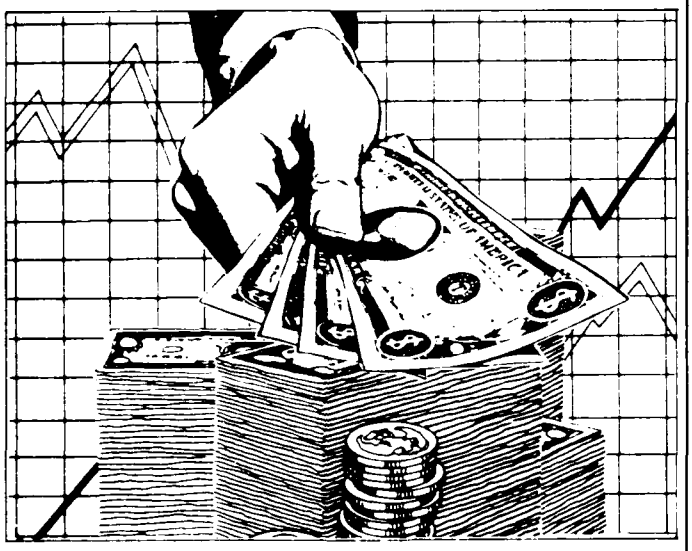
"Contracting Initiative: Best Proposal for Price" by Barbara Rose

With ever-increasing emphasis being placed on Department of Defense acquisition improvements and reduction of acquisition lead time, the Air Force Systems Command, Armament Division, has developed and is testing a contracting initiative referred to as "Best Proposal for Price." This concept is intended to significantly reduce efforts by government and contractor personnel and thereby reduce acquisition lead time while maintaining the integrity of competitions that are limited by funds.

Best Proposal for Price contemplates award without negotiation, if possible. The main thrust is to identify the government's maximum contract dollar amount in the solicitation, thus minimizing the negotiation processing time and yet ensure technical performance.

Offering potential for improving present negotiation contracting procedures, the very nature and structure of Best Proposal for Price lends itself to some controversy. Never-

theless, Best Proposal for Price has the intrinsic momentum to be highly contributory in government contracting strategy.



COST APPLICATIONS

"A Cost Based Acquisition Planning Model Utilizing Expert System Concepts" by Marco A. Bucciarelli and George L. Roeder

A micro-processor-based computer model utilizing expert system concepts has been developed to provide cost-based acquisition planning information to the DOD acquisition community. The model, called ACROM, is a menu-driven, inquiry-response system wherein qualitative acquisition profile descriptions are converted, via embedded algorithms, to quantitative system acquisition cost estimates in a MIL-STD-881A Work Breakdown Structure (WBS) format. The choice of one of two input modes provides a top-down (Mode A) estimate using only six high-level input parameters or a bottom-up (Mode B) estimate by characterizing each of 45 WBS elements for the system acquisition. Estimates may be accumulated by subsystem for large-scale programs or by phase for total program and/or life-cycle-cost estimates. The model has been exercised for over 70 DOD system acquisitions and has provided relatively accurate estimates for electronic computer-based systems. It is anticipated that continued use of enhancements of the model will improve the embedded "expertise" in specialized acquisition areas and will provide a readily accessible and easy-to-use program management support tool in the critical area of system cost.

"Computer Generated Acquisition Document System (CGADS)" by Stephen F. O'Shaughnessy and George L. Roeder

The Computer Generated Acquisition Document System (CGADS) is a computer program written in F77 (version of FORTRAN 77) through which draft Statements of Work and Contract Data Requirements Lists for weapon systems acquisitions may be created. CGADS was developed by the Electronics Systems Division at Hanscom Air Force Base, Mass., to provide automated assistance to project/procurement offices in the development of acquisition documentation for inclusion in solicitations and Requests for Proposal.

"Computer Aided Source Selection (CASS)" by George L. Roeder

The source selection process in the Department of Defense is a labor-intensive effort which ties up the management, technical, and administrative resources of acquisition agencies on a continuing basis. At a typical AFSC product division such as the Electronic System Division, Hanscom Air Force Base, Mass., it is estimated that from 20 to 50 source selections are conducted annually to evaluate competitive proposals. Evaluation teams can range from 5 to 50 evaluators supporting one or more source selection organizational functions for 2 to 12 months.

In addition, there are a variety of *ad-hoc* teams which support the process depending upon the magnitude, complexity, and criticality of the acquisition.

"An Application of the Causal-Integrative Model" by Ivan A. Somers and Peter C. Gardiner

Historical analyses of program acquisitions indicate that the probability of cost growth and/or schedule slippages is high. Many research efforts have been directed at identifying the causal factors leading to these changes in program performance. Much of the research has been devoted to modeling the acquisition process with the goal of a more effective control of program performance. The acquisition process is a complex and interrelated set of events. As such, any comprehensive model that claims to represent this process must reflect these interrelated activities, many of which can be described by feedback loops.

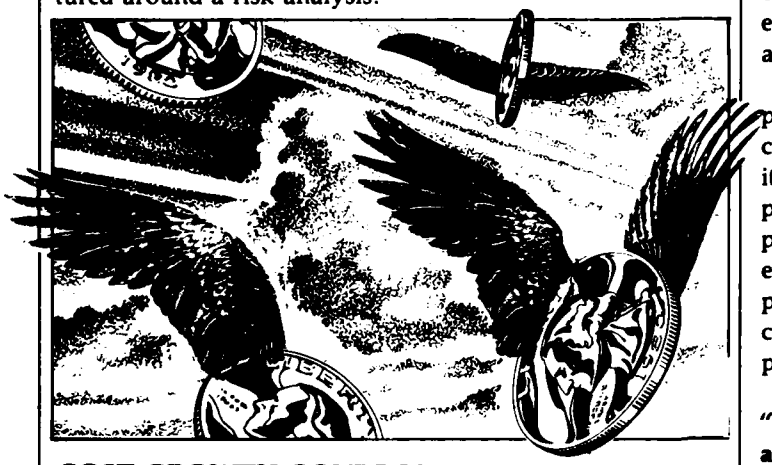
This paper discusses one such model that utilizes the systems dynamics approach to simulation to portray the processes that form collectively the program acquisition cycle. The Causal-Integrative Model was presented in its conceptual form at the Management of Risk and Uncertainty Symposium in February 1981 at the U.S. Air Force Academy, Colo. This paper reports on the computer-based operational form of the CIM.

"An Automated Airframe Production Cost Model" by Norman Keith Womer

This paper is dedicated to developing a better understanding of the factors and forces that determine weapon system cost during production, and reports on a tool that provides timely estimates of the cost impacts of program policy decisions. This tool was developed from theoretical principles. The economist's production function was incorporated into a model that addressed the realities of program management. The model uses the calculus of variations to include the production cost drivers of learning by doing, learning over time, the speed of the production line and production line length. It is estimated from data on the C-141 program and tested on other Air Force programs. This work is fully documented in *Cost Functions for Airframe Production Programs*, a report prepared for the Air Force Business Research Management Center and the Office of Naval Research.

"Risk Analysis: Comparing Different Contract Types" by George Worm

This paper presents a brief description of how the results from a cost risk analysis can be used to distribute the risk in a contract between the government and the contractor. The main contract types discussed are firm fixed price and fixed price incentive, although other contract types may be structured around a risk analysis.



COST GROWTH CONTROL

"Managing for Success in Defense Systems Acquisition" by J. Stanley Baumgartner, Calvin Brown, and Patricia Kelley

This study, an offshoot of a DOD cost growth study, was conducted to identify elements common to successful programs, which met most of their cost, schedule, and performance goals, and produced systems that worked well when fielded. Key government and industry officials of 12 "successful" programs were interviewed to find out how success is measured and what impact various forces had on the success of these systems. The primary measure of success is that the system worked well when fielded. Main elements of a successful program are stability, realistic requirements, good people, good leadership and, particularly, confidence and teamwork between the program office and the contractor. The PM's tenure, pushing the state-of-the-art in technology, and meeting the requirements of regulations and directives have little impact on the success of a program. Outside influences are, on balance, helpful.

"Nuclear Reactor: On Schedule and Under Cost" by Robert D. Larson

The National Society of Professional Engineers has named the Fast Flux Test Facility (FFTF), an experimental nuclear reactor cooled by molten sodium, one of the nation's ten top engineering achievements of 1982. The reactor is located in Richland, Wash.

The FFTF core simulates the high temperatures, pressures, and intense neutron radiation expected in breeder reactors, allowing scientists to test various alloys and fuels for breeders of the future. Breeders are reactors that create or "breed" more plutonium fuel than they consume, thus expanding potential energy supplies. The FFTF was built over a 10-year period, and began regular operations in April 1982.

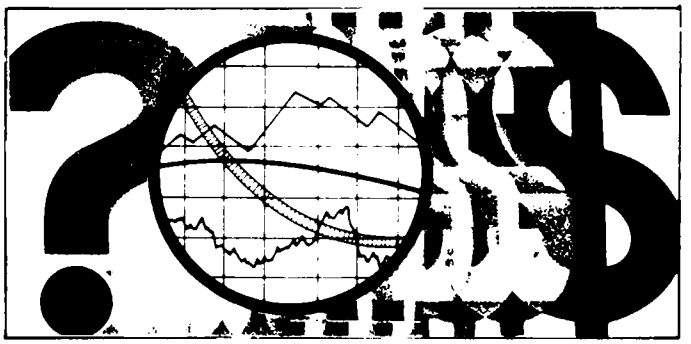
"Reshaping the Philosophy of Spare Parts Acquisition: Project Pacer Price" by George Leininger

On June 1, 1982, a new program called Pacer Price began operation at the Oklahoma City Air Logistics Center. Staffed by an interdirectorate group of engineers, manufacturing planners, price analysts, and packaging specialists, it was designed as a thorough and comprehensive review process to determine optimum purchase method and price for every actively purchased replenishment spare part managed at the Center.

After 3 months of program operation, approximately 62 percent of the sole-source items have been recommended for competitive purchase, and the prices recommended for these items average about 35 percent below the latest contract prices adjusted for quantity and inflation. A new "philosophy" of spare parts purchase also has been formulated and effected as a procedural caveat: All spares should be both purchased competitively and priced to conform with competitive-market prices. This paper focuses on this philosophy.

"The Problem of Cost Growth" by Dr. Gerald R. McNichols and Bruce J. McKinney

There is much rhetoric on the subject of cost growth. Usually, we blame such growth on "inflation." There are, in fact, several views on the *reasons* for cost growth or the *measures* used to calculate and present cost increases by weapon system. This paper discusses the problem from a historical perspective, and presents actual results from an analysis of the December 31, 1981, Selected Acquisition Reports.



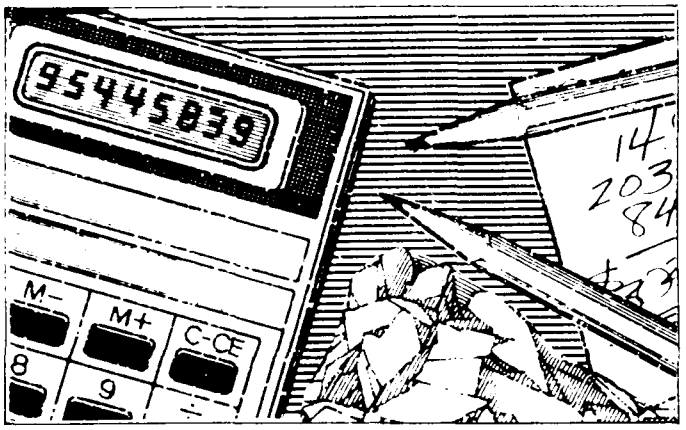
COST IMPACT OF PRODUCTION RATE VARIATION

"Economic Production Rate Study" by Edward J. Downing, Jr., Gilbert E. Roesler, and William M. McGovern

Department of Defense Acquisition Improvement Program Action 7 stresses the need for each program manager to reduce the unit cost of his system by planning for and maintaining an economic production rate (EPR). The key elements in achieving an EPR are early planning and program stability. However, since stability is seldom possible, flexibility to accommodate a change to the production rate must be built into the plan. For this purpose and also to answer "what if" budget questions, it is important to have a model that relates rates of production with their corresponding estimated unit costs.

"An Automated Airframe Production Cost Model" by Norman Keith Womer

A better understanding is needed of the factors and forces that determine weapons system cost during production. A tool that provides timely estimates of the cost impacts of program policy decisions has been developed from theoretical principles. The economist's production function was incorporated into a model that addressed the realities of program management. The model uses the calculus of variations to include the production cost drivers of learning by doing, learning over time, the speed of the production line and production line length. It is estimated from data on the C-141 program and tested on other Air Force programs. This work is fully documented in *Cost Functions for Airframe Production Programs*, a report prepared for the Air Force Business Research Management Center and the Office of Naval Research.



ESTIMATING AND PRICING ANALYSIS

"Expert Systems for Price Analysis: A Feasibility Study" by J. F. Dillard, K. Ramakrishna, and B. Chandrasekaran

The feasibility of alternative designs for an expert price analysis computer system is evaluated by analyzing the price analysis task, and the related support requirements, as performed by Air Force procurement activities. Generally, the Air Force should embark on a coordinated, long-range program of providing adequate expert system support to all procurement functions. Initially, this support can best be provided by a highly structured, interactive system that confronts the system user with requisite decision sequences. Each sequence points to a tutorial network that provides explanation and instruction if desired. The most immediate benefit will be experienced at the base level where little expert assistance is currently available. This type of expert system provides the nucleus for developing more sophisticated expert systems for other procurement activities in the intermediate and long term.

"Contractor 'Hungriness' and the Relative Profitability of DOD Business" by Professor Willis R. Greer, Jr., and Professor Shu S. Liao

DOD-contractor profitability is very much an issue. Some feel low profits may convert defense business into a "market of last resort." Others allege defense contractors earn "excessive" profits. There is a contradiction between these viewpoints. Data covering 20 years show that program managers take advantage of the bargaining power they hold to buy goods at substantially lower profit margins when capacity utilization is low. The returns earned by contractors on DOD business are measurably lower than returns on commercial business during periods of low capacity utilization. Also, the volatility of returns is higher for DOD business, which means risks are viewed by management as somewhat higher.

"Independent Cost Estimates: A Case Study Joint Vertical Lift Aircraft (JVX) Program" by Dr. Gerald R. McNichols and Gary L. Sorrell

In 1982, the Army was intrigued with a concept known as the Joint Vertical Lift Aircraft. Because of the nature of the program, an independent cost estimate was performed to "double check" the program office estimate. While the Army appears to have lost some interest in the program, this cost study illustrates the process of independent cost estimating.

"An Intelligent Manual for Price Analysis" by K. Ramakrishna, J. F. Dillard, T. G. Harrison, and B. Chandrasekaran

The authors investigated price analysis as performed in the U.S. Air Force and the environment in which buyers at bases make decisions about procurement actions. This study led to an evaluation of the "intellligent manual" approach for *guiding* a buyer through the decisions and actions necessary to conclude a buy. An intelligent manual is a computer-based consultant that provides advice and pointers on the use of existing information in response to user queries. The design of the interactive intelligent manual (based on our analysis of pricing) and its short-term and long-term implications for procurement in the USAF are discussed in this paper.

"On 'Before' and 'After' Cost Comparisons" by Dr. Robert M. Stark

Comparison of *a priori* cost estimates with *a posteriori* payments is about as pervasive as it is instinctive. A new result of mathematical optimization and probability theories leads to the unexpected conclusion that such comparisons, even for many idealized engineering designs, appear to be invalid. "Before" and "after" costs are unit samples from populations with different probability distributions.

"Cost Realism: Assuring More Realistic Contractor Cost Proposals" by Donald L. Trapp

Unrealism in defense contractors' cost proposals, especially for RDT&E programs, often contributes to cost growth as well as other problems. The Defense Department is therefore concerned with achieving greater cost realism. A methodology has been developed for achieving greater realism of contractor cost proposals that define cost realism as an evaluation criterion stated in the solicitation which compares the offeror's proposed cost with a detailed government estimate

for each contractor and then scores the degree of realism. The methodology constitutes a source selection cost evaluation process involving (1) determination of cost evaluation factors, (2) preparation of instructions to be included in the solicitation concerning the cost evaluation factors, (3) preparation of government estimates for each offeror, and (4) scoring each offeror for cost realism and government estimated cost. The methodology is a synthesis and improvement of the best techniques and procedures currently being used in source selection cost evaluation (especially those of NAVELEX).

INDUSTRIAL PREPAREDNESS

"Impact of Corporate Resource Allocation Decisions on National Security Objectives: Dissynergism in Aerospace Industrial Resource Planning" by Lieutenant Colonel O. M. Collins, USAF

This is an assessment of the impact of corporate resource allocation decisions in the U.S. aerospace industry on long-term national security objectives. The data presented demonstrate the dissynergy in one critical area of national interest as the result of inconsistencies between corporate and defense strategic resource planning objectives. The DOD Industrial Base and Preparedness Program is evaluated as a basis for (1) creating a credible defense industrial resource planning system to parallel existing force and technology planning systems, and (2) integrating corporate and defense long-range planning objectives. A recommended policy and organizational approach is presented in terms of acquisition efficiency and industrial preparedness.

"Two-Step Industrial Preparedness Planning: Balancing Funds and Production Capability" by Kenneth B. Johnson

The industrial preparedness planning program provides data relative to the capability of the production base to accelerate and expand production during a national emergency. Planning data also includes identification of industrial preparedness measures (IPMs) that can be funded during peacetime to compress production build-up time. However, determining what IPMs to fund can be difficult since (1) build-up times for components of end-item weapons vary by substantial margins, and (2) available funding is usually inadequate.

This difficulty could be minimized by adjusting IPM data for pacing components to correspond to a common build-up time based on an affordable funding level. Formalizing the adjustment of IPM data in this manner as a second step in the industrial preparedness planning process would facilitate effective prioritizing of peacetime funding for IPMs for potential production bottlenecks to support a balanced production response capability.

"Readiness Planning in a Peacetime Environment" by George T. Nickolas

Readiness planning in a peacetime environment will enhance the ability of DOD to respond to a Vietnam-type conflict, quick deployment of the rapid deployment force (RDF) to a world trouble spot, or the initial phase of build-up in a mobilization situation. A novel way of obtaining information and facilitating rapid acceleration of defense contractors without the formal declaration of war or a national emergency is highlighted here.

INTEGRATED LOGISTICS SUPPORT

"Policy Initiatives to Achieve Readiness and Support Objectives" by Joseph D. Arcieri

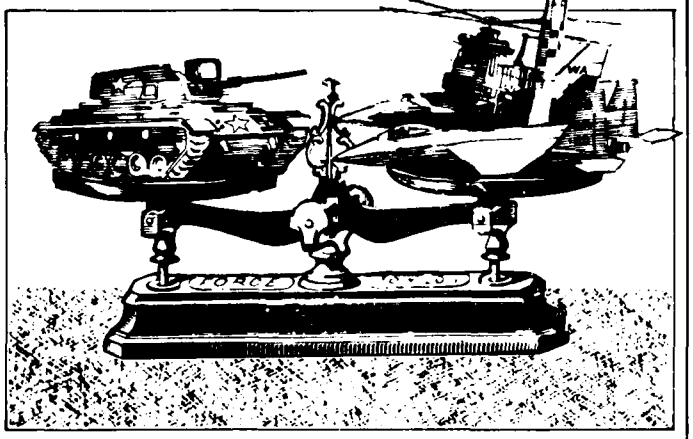
The fundamental responsibility of the defense logisitics community is to ensure timely availability of requisite support to enable our forces to effectively deter aggression and, should deterrence fail, to successfully undertake military operations that prevent the enemy from achieving his goals at minimum war cost to the United States and its allies. This means the logistics community of organic and industrial capability must ensure military force readiness and sustainability. This formidable responsibility imparts a concurrently dual-edged challenge: (1) obtaining affordable life-cycle cost/effective supportable systems, and (2) continuing improvements in the effectiveness and efficiency of our logistics systems operations. To meet this challenge DOD has undertaken several policy initiatives to achieve more intensive and effective logistics involvement in the acquisition process. Particularly, attention has been given to changing top-level acquisition policy directives and instructions, and in changes to the logistics support analysis requirements outlined in MIL-STD-1388. The purpose of these changes is to concentrate adequate management attention on the early phases of the acquisition process where the greatest influence can be made on system design characteristics.

"1982 U.S. Army Materiel Development and Readiness Command (DARCOM) Integrated Logistics Support (ILS) Study Finding on Contracting for ILS" by David M. Morgan

This is a general overview of the objective, organization, and approach used by the 1982 DARCOM ILS Study. The seven high-payoff areas of concentration are listed, but only the results of the solicitation documents study effort are discussed in detail.

"The New MIL-STDs 1388" by John E. Peer and David L. McChrystal

The concept for LSA was originally set forth in MIL-STD-1388-1 published in October 1973. Since that time each service has pursued an independent course in the applications of LSA. DOD policies and directives for ILS and LSA have changed to reflect refinements to and availability of analytical techniques developed to meet state-of-the-art hardware requirements. This paper describes the latest effort to provide a standard LSA with the broadest possible application. The recently published MIL-STD-1388-1A overcomes many shortcomings that were identified with the original military standard. Also discussed is a proposed version of MIL-STD-1388-2A, DOD Requirements for a Logistic Support Analysis Record.



MANAGEMENT OF SUPPORT RESOURCES

"Central Demand Data Base (CDDB) End Item Code (EIC)" by George Campbell

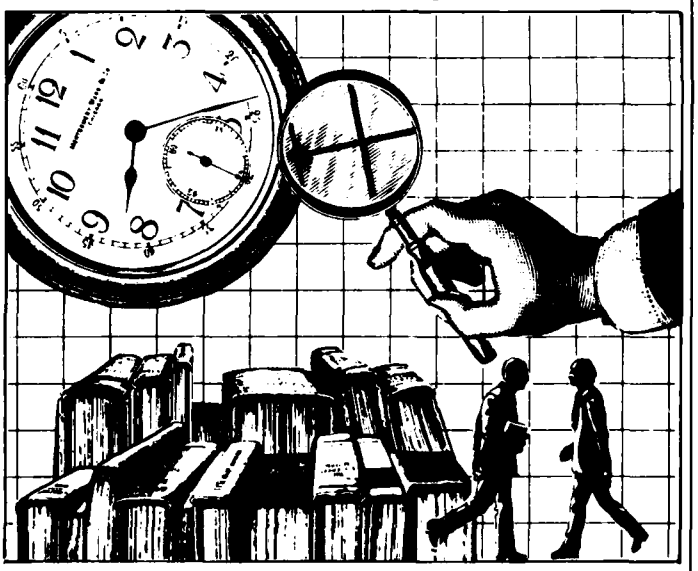
One difficult task facing Army logisticians is the accurate determination of the repair parts stockage levels to support the equipment in the hands of the soldier. Decisions on total repair parts consumption are based on demands, but repair parts for individual fielding of equipment in operational units are based upon estimates known as failure factors (FFs). These FFs established during the initial deployment of equipment are used throughout that equipment's life cycle. To update FFs, individual repair parts consumption must be identified to a specific end item application. The problem has been no sufficiently reliable and valid data source to identify and collect data to update FFs. The EIC was designed to identify and capture individual repair parts consumption by specific end items, and provide the Army managers with an accurate record of repair parts consumption throughout the life cycle of an end item.

"Project: Acquisition Strategy" by William D. Majewski

Army depots rely upon major systems (i.e., major commands and the Defense Logistics Agency) to support their mission by providing approximately 80 percent plus of their logistics needs. This paper concerns the apparent delay in response time that the major systems provide for depots.

"Improved Management of Support Resources" by David V. Glass and Donald W. Srull

Improving the management of support resources for major weapon systems is a crucial goal for the Department of Defense. The problem of weapon systems being inadequately supported in the field because of fragmented decision-making in the allocation of support resources (e.g., spares, support, and test equipment) was addressed in DOD Acquisition Improvement Initiative 30. New management procedures to help correct this problem were tested during the FY 83 and FY 84 budget reviews and the FY 84-88 program review. In this paper we evaluate the test results in terms of the feasibility of identifying individual weapon system support resource needs, and the utility of collecting and reviewing this information during key points in the planning, programming, and budgeting process. Several recommendations are given to improve the trial procedures and to move the initiative to final implementation.



MARKET RESEARCH AND ANALYSIS

"Large Firm Efficiency, Concentration, and Profitability in Defense Markets" by Dr. Robert F. Allen

This paper attempts to quantify the relative impacts of large firm efficiency and market power on profit margins in defense industries. The methodology employs a direct measure of firm efficiency together with a conventional measure of market power. Large firm efficiency and the effective use of market power generally appear to be present in industries characterized by decreasing costs. However, the basic defense industries—aircraft, missiles, ordnance, and shipbuilding—are notable for the absence of large firm efficiency and the absence of effective use of market power by leading firms.

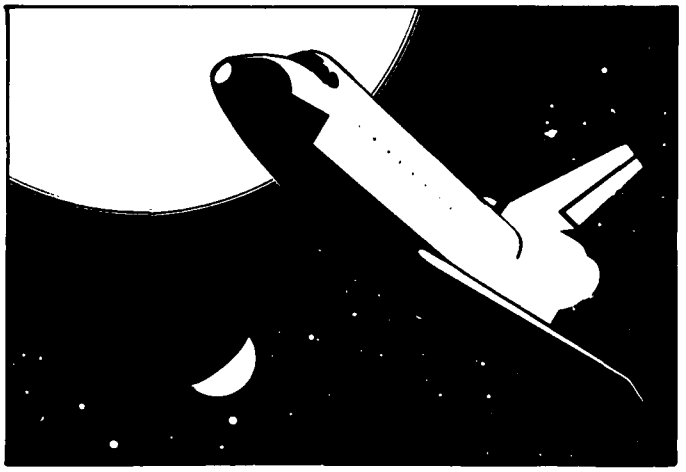
"Export Trade: Big Business for the Small Entrepreneur" by Jeanne M. Colachico

American corporations have been spoiled by lucrative and previously expanding domestic markets, with the result that exporting was largely conducted by corporate conglomerates. Although government regulation and trade laws discouraged many from entering the international marketplace, small businesses themselves limited their own horizons. Today, economic insecurity and the lack of developing domestic markets demand that small businesses overcome the fear and unfamiliarity of foreign markets, regulations and customs, the expense, lack of resources, and inadequate capitalization that have made exporting previously prohibitive.

"Tactical Buying Decisions for Stategic Petroleum Reserve Spot Procurements: The Tunnel Theory" by Lawrence C. Ervin

Procurement of crude oil on the spot market at minimum prices requires economic analysis that focuses on the discovery of market-price levels and the determination of short-run market direction.

The paper presents the results of statistical research concerning formation of spot prices in the crude oil market. Variables suggested by the economic theory of raw material and commodity markets are investigated. The demand for incremental (spot) volumes of crude oil is found to be derived from the demand for incremental volumes of petroleum products. Insights gained from this analysis are used to establish tactical decision rules to be followed when making purchases under the provisions of the Defense Fuel Supply Center's open and continuous solicitations on behalf of the Department of Energy Strategic Petroleum Reserve. The results of this research are also shown to be important input for strategic decisions concerning the mix and timing of spot and long-term contract procurements.



MULTINATIONAL APPLICATIONS AND INNOVATIONS

"New Initiatives in International Programs" by John S. W. Fargher, Jr.

The paper entitled "Management of Multinational Programs," based upon the research results contained in the Joint Logistics Commander *Guide for the Management of Multinational Programs* developed by the author, was presented in the 1982 Federal Acquisition Research Symposium *Proceedings*. This paper is intended to provide an update of new initiatives developed and implemented since the paper and guide were published. Examples of two new international programs, the U.S. Army/U.S. Marine Corps Light Armored Vehicle (LAV) and the U.S. Army Advanced Attack Helicopter (AAH), are presented. The author served as the Deputy Project Manager on the LAV and consultant to the AAH Program Manager to establish an international consortium for coproduction of the Advanced Attack Helicopter.

"Rationalization, Standardization, and Interoperability: Protecting U.S. Interests in the Process" by James H. Gill

The military necessity for rationalization, standardization, and interoperability (RSI) increases as the possibility of a non-nuclear European war increases. The no-first-use-of-nuclear-weapons policy, of considerable attention in the recent past, must inevitably dictate that conventional force capabilities be significantly improved.

One dramatic force multiplier is the capability of all nations to utilize weapon systems that are either the same (standardization) or at least compatible in fuel, ammunition, and communication.

National security may be viewed in the context of capability and credibility. If a nation (or alliance) has no capability, the credibility of its actions is not significant. NATO has been viewed by its members as a vehicle whereby the synergistic sum is greater than the sum of its parts. The viability of NATO will ultimately depend upon the willingness of the individual states to sacrifice their national interests for the advantage of projecting a combined conventional capability sufficiently credible to deter Soviet aggression. For this reason alone, a rational RSI program must be an integral part of U.S./NATO strategic planning.

"FMS (Foreign Military Sales) Support Opportunities of the 1980/90s in SE Asia" by Harold L. Segerson

Future sales of modern, high-technology aircraft and systems to Southeast Asian countries will establish an extraordinary demand on resources and funds for operational support. The countries will specify in-country assembly of aircraft and/or production of systems and items in the sales agreement. The countries are presently establishing or improving depot-level repair capability.

The U.S. aircraft and weapons system industry realizes that the world competitive market requires cost offset programs that enable high technology work to be placed in the buying countries. DOD and the State Department have recognized the need to assist the Southeast Asian countries in developing a higher technology capability through training and assistance in development of more sophisticated electronics and heavy industry.

PRODUCT ASSURANCE

"Quality Assurance—Air Force Logistics Command" by Colonel Paul Brown, USAF

This paper examines the scope of the Air Force Logistics Command (AFLC) mission and focuses on current management indicators and initiatives related to quality assurance. The quality assurance discipline within AFLC is tasked with the responsibility of corporate oversight of the quality of workmanship of the commands' products, goods, and services. Since fiscal year 1976, adverse trends have been noted in frequency of customer-reported defects on these weapon systems, and several innovative and dramatic steps have been taken to reverse the decline in the technical competence of our work.

In February 1981, the command established a Maintenance Industrial Quality Study Group that was chartered to examine the entire spectrum of quality, with special emphasis on the five major categories of policy guidance, people programs, technology, investment benefits, and management systems.

The ultimate goal of the study was to formulate a quality effort that placed maximum emphasis on defect prevention rather than defect correction. The study concluded with 22 major initiative recommendations, many of which are currently in effect and in operation in our depots. It was anticipated that the fruits of such initiatives would not be visible in the short term, but the fiscal year 1983 operating results do show specific evidence of the favorable impact of the initiatives, and the long-term outlook is even more promising.

"The Avionics Integrity Program (AVIP)" by Thomas J. Dickman and Major [illegible] F. Cheshire, USAF

The Avionics Integrity Program is an Aeronautical Systems Division initiative to develop an orderly procedure to assure that we acquire reliable, high-quality, and supportable avionics systems. A draft military standard has been prepared and distributed for review and comment. The draft standard outlines an orderly process using existing tools in order to assure integrity. The orderly technical process, combined with an appropriate contract strategy using incentives, is expected to yield the highest probability of success in achieving integrity.

"Quality at the Crossroads" by Colonel Charles R. Henry and James C. Albini

In the coming years, American product quality will continue to be severely challenged in the world marketplace. We have lost much business and many jobs to foreign suppliers. Our nation's industry has suffered excessive loss of profits due to waste of materials and resources. Although foreign suppliers at one time held a substantial price advantage, this is no longer true in many instances. We are losing markets because of quality and reliability deficiencies.

For the most part, American management has not fully grasped the impact of this quality challenge. They fail to recognize that effective quality control and assurance systems contribute significantly to profits, along with a product that conforms to specifications. Certain tasks are clearly defined for American industry and the military establishment; high quality performance is essential.

This paper concludes with what is needed if we are to regain our position of leadership in the world marketplace.

"Incentives for Product Quality Need Contract, Cost, Production, and Field Co-Operation" by Edward Theede

The quality of a deliverable item, whether hardware or software, is dependent upon the controls in place and the adherence to those controls. Military procurement generally requires an inspection system (MIL-I-45208a) and a quality system (MIL-Q-9858a) to assure product quality. Monetary incentives must be available to the individual complying with the controls that produce the characteristics. Material inspection via statistical means only provides a clue as to how many defective units may be in the lot. Statistical sampling is obviously advantageous to a contractor since the government accepts the probability of receiving a defective product. All topics presented today are trying to help the government get the most for its money. The negative cost effects of material review boards, standard fixes (shop arrangements and field activities), statistical quality control, surplus parts procurement, and contractor field service are usually figured in overhead and are not carefully examined and/or controlled. This paper points out experiences in these areas and leaves to our imagination how the heavy man-hour involvement and costs associated with these areas could be minimized if quality incentives were provided at the manufacturing point.

"A Quality Improvement Strategy for Systems Acquisition" by George J. Thielen

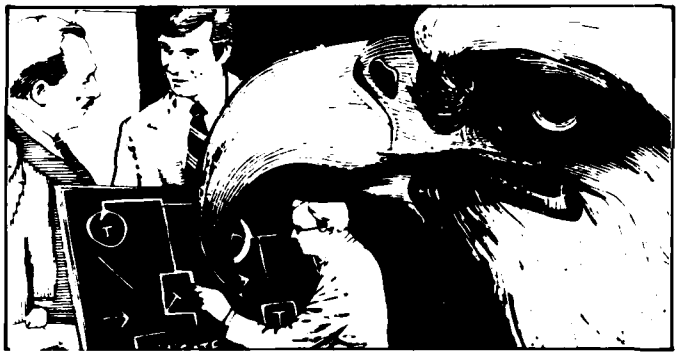
Today, after decades of neglect, we are seeing increased interest in statistical quality control tools by commercial companies. Along with some modern techniques of quality/productivity improvement, these older, proven tools are being applied with new vigor by many companies as a key to their survival in a marketplace characterized by international competition and more discerning customers.

The author portrays quality in systems acquisition and from this commercially oriented perspective. An improvement strategy that is relevant to both readiness and afforda-

bility is outlined. It treats "quality" in its broadest, multifunctional sense. The bottom line is that if quality/productivity improvement is important to us in defense, then we must "manage" to get it. The strategy to be discussed is not a one-shot "program" or a quick fix. Rather, it is a basic shift in how we approach our work and is based on application of successful commercial practice to the system acquisition environment.

"Engine Product Performance Agreements and the Future" by Juanita Vertrees

Engine product performance agreements may take many forms, one of which is warranty. The Model Engine Warranty developed by the Air Force, iteratively, over a 3-year period, is one of many variations. It is to be tailored to fit the situation and was designed to help engine program managers formulate a warranty if one is part of their strategy. One possible outcome of considering warranty is that a warranty is not needed. This paper explores aspects of the Model Engine Warranty and its improvements over earlier warranties. Future forms of engine product performance agreements are mentioned. The concept of future commonality or standardization is discussed, along with some of its perceived benefits.



PROGRAM MANAGEMENT

"Defense Systems Acquisition Review Process: A History and Evaluation" by David D. Acker

This paper presents the salient points from a 650-page report and some comments regarding the effectiveness and efficiency of the defense systems acquisition review process. The origin and evolution of the Defense Systems Acquisition Review Council (DSARC) and the Defense Resources Board (DRB) are reviewed; and observations and perceptions of the review process are made, based upon an analysis of several defense system programs.

The functional question to be answered by the evaluation of the review process is whether experience has shown that DSARC reviews are still the most effective way to ensure a smooth transition of a defense system program from one program phase to the next phase. The experience data base used in answering this question is the result of (1) fact-finding investigations of 16 programs, and (2) interviews with current and prior DOD officials having defense system management knowledge and experience. Conclusions and recommendations are offered, based upon the results of the evaluation.

"A Concept for Mission-Oriented Planning for System Acquisition at the Defense Communications Agency" by Fred L. Adler, C. Bruce Baird, and Joseph S. Domin

The Defense Communications Agency (DCA) is responsible for a broad range of system acquisition functions for Department of Defense (DOD) command, control, and communications programs, as well as analytical and automatic data processing support to the Joint Chiefs of Staff and the Office of the Secretary of Defense. To better accomplish these functions DCA has begun a corporate-wide system integration initiative based on mission planning consistent with DOD Directive 5000.1, "Major Systems Acquisition." The initiative has three objectives: higher quality mission analysis, a better bridge from mission analysis into system acquisition, and more effective consideration of supportability of C^3 systems and equipments. This paper describes DCA's planning initiative, its implementation approach, and the current status. The initiative, a mission-oriented planning concept, is currently under development and trial implementation within DCA.

"Project Management: Evolution and Influence" by David I. Cleland

This paper briefly examines the evolution of the theory and practice of project (program) management as an integral part of the management discipline. This examination hints at the origins of project management and how it has influenced the management of contemporary organizations. The author reviews some of the influences that project management has had on contemporary organizations.

"Program Manager's Support System (PMSS): An Update" by Jesse E. Cox, Ted Ingalls, and Harold J. Schutt

The defense systems acquisition process is a complicated process requiring the integration of many disciplines and functional areas. The defense program manager (PM), in executing an assigned program within this environment, is faced with many non-routine and unstructured decisions. Although management information systems typically are available to the PM and provide information to aid in making these decisions, they predominantly support only past and current project status, usually with an abundance, and many times, perhaps, an overabundance of data. A need exists, therefore, to support the PM's decision-making process by looking at future courses of action, assisting in answering the "what if?" and "should I?" questions, and distilling the available data into meaningful alternatives. This need is being addressed at the Defense Systems Management College through a research project aimed at applying decision support system technology to the defense weapons systems program management environment. This paper describes the resultant Program Manager's Support System effort.

"Mortality and Spare Parts: A Conceptual Analysis" by Dr. Franz A. P. Frisch

The mortality concept describes how a "population" deteriorates and what is needed to maintain a population. These

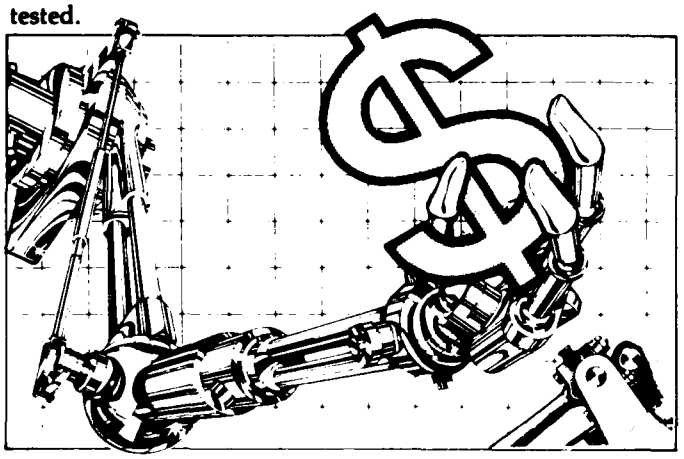
are populations, or families, of spare parts needed to support military weapon systems.

The mortality concept is explained and used to delineate the necessary resulting behavior of families of spare parts. The "necessary behavior" is defined as particular behavior that follows, by necessity, the selected *mode* of acquisition (i.e., block procurement) and from the selected *quality* of the system.

A generic model is sketched and sample calculations are provided to allow the reader to arrive at firm conclusions about the necessary behavoir.

"Improving the Effectiveness of Award Fee Contracts for Program Management Support Services" by Dr. Arthur C. Meiners, Jr.

This article reports on a method to improve the effectiveness of cost-plus-award-fee contracts used for program management support services. The approach involves allowing employee participation in the receipt of award-fee dollars through a concept called cost-plus-award-fee, employee participation, or CPAF(EP). An example of an unsuccessful attempt to use CPAF(EP) is presented and a possible solution to problems associated with the use of EP on support service contracts is introduced. The recommended solution is centered around the use of a "criteria-oriented" EP system, similar to criteria developed for a cost/schedule control system. A major element in the EP system presented is simplicity, in that any EP system must be easy for a contractor to administer. The article concludes with a standard recommendation that CPAF(EP) criteria be developed and tested.



RELATED ASPECTS OF PRODUCTIVITY IMPROVEMENT

"Contract Requirements—A Key to Controlling DOD Acquisition Costs" by Lieutenant Colonel Frank E. Doherty

This paper suggests that controlling contract requirements can hold the key to lowering DOD systems acquisition costs, and describes a proposed DOD initiative designed to help control imposition of non-cost-effective contract requirement in DOD contracts. The proposed initiative is based on recommendations from a Defense Systems Management College report developed in conjunction with the Joint Logistics Commanders, The Boeing Company, and the Council of Defense Industry Associations in support of Acquisition Improvement Program Initiative 14. Major recommendations from this report call for: (a) specifying in requests for proposals and contracts "what" is needed, not "how to" accomplish it; (b) requiring contractors to tailor during one phase for application to the next; (c) not requiring referenced documents to be contractual unless specifically identified as such; (d) ensuring that production specifications are not contractually applied to production; and (e) providing incentives to program managers to encourage accomplishment of the recommendations cited above. This paper concludes that the key problem to be solved is bridging the gap between current DOD policy and practice. A DOD initiative has been proposed to identify candidate programs for applications of these concepts.

"Material Handling—A Target for Productivity Improvement" by Richard T. Gibbons

Material handling, as it applies to manufacturing and related operations, is generally accepted as a major cost driver for any contractor. Inasmuch as it does not directly add to the value of the manufactured part or assembly, material handling in most cases has not been given the attention it deserves until the last decade or so. During the '70s, most contractors became more aware of an idea called "productivity," or the ratio of output to input. Any increase in productivity, it is surmised, would mean an increase in return on investment.

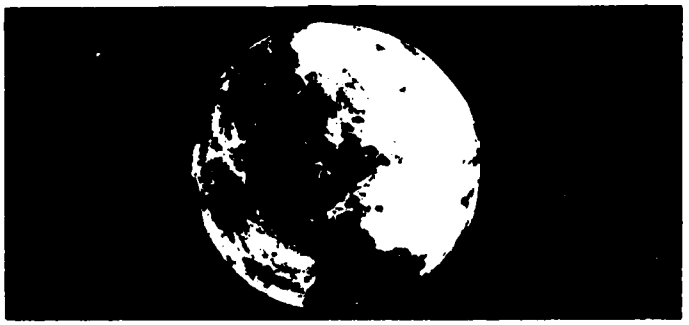
"The Impact of Factory Automation and Robotics on the Contracting and Acquisition Processes" by Dr. M. Dean Martin and Robert D. Guyton

A report issued by the U.S. Comptroller General in 1976 noted that virtually every item produced by U.S. industry is procured by the federal government. Products and services are procured by the Department of Defense from over 25,000 industrial firms. The basic mechanism is through the contracting and acquisition processes. The key question raised by these circumstances is how the increasing use of automation and robotics will impact the contracting and acquisition processes in the 1980s and 1990s. A study was conducted to identify and classify changes that will result from this trend to factory automation. The items considered include: reclassification and structure of contract costs, contracting and acquisition planning, contract types and their use, cost visibility, labor and other direct costs, cost and price analysis, cost control, bidding and solicitation procedures, and clause structure and selection.

"A Survey of Contractor Productivity Measurement Practices" by Monte G. Norton and Wayne V. Zabel

This paper is extracted from an interim Army Procurement Research Office report describing the results of a survey of contractor productivity measurement practices. Respondents ranking organizational performance evaluation factors listed productivity fifth in importance behind profitability, effectiveness, quality, and efficiency. Problems encountered in measuring productivity were usually due to the complexities of quantifying and relating various input and

output factors involved. Although no evidence was found from the survey that an integrated total factor productivity measurement system has been implemented, production cost and productivity information is available and currently being tracked with varying success by defense contractors. The most popular indices used are value added/employee and a comparison of standard hours to actual hours.



SOCIO-ECONOMIC CONSIDERATIONS

"Strengthening Small Business Participation in Department of Defense Extramural Research and Development" by Bernard K. Dennis

This paper discusses steps taken by the Defense Technical Information Center (DTIC) to strengthen small business participation in DOD extramural R&D, indicates a need for explicit attention to information transfer requirements by R&D contract administrators, and concludes with a suggestion to the DOD contract administration community. Many factors impede small business efforts to do R&D business with the federal government. These run the gamut from federal procurement policies, regulations, and procedures; beliefs, biases, and practices of federal R&D people and their management systems; and the formidable advantages of bigness in the federal marketplace. Information transfer issues exacerbate the impacts of all the above and further reduce small business capabilities to compete for and to perform federal agency—particularly DOD—R&D projects. The studies and testimony leading to the Small Business Innovation Development Act of 1982 indicated a need for change in federal agency approaches to R&D contracting. DTIC's approach has been to mitigate the impacts of information transfer barriers on small R&D firm efforts to do business with DOD.

"Contractor Fraud—Government Response" by Professor James O. Mahoy

Air Force logistics support is adversely affected by the presence of fraud in government contracts. Fraud occurs in the award of contracts, technical aspects of performance, and in submission of false claims. Dishonest contractors, a small minority, must be found out and brought to justice. The response of the government is channeled along several lines. Fraud is a civil and criminal matter. The government may sue for criminal penalties and debar bidders. The contracting officer and eventually the whole contracting team may be needed to detect fraud. The using activity, the Office of Special Investigation, the FBI and ultimately the Justice Department attorney and federal court are involved.

"Employment Changes Resulting from the Award of Contracts in Labor Surplus Areas" by Dennis Robinson and Daniel Gill

Until 1981, the Department of Defense, as a result of amendments to their annual appropriations acts (known as the Maybank Amendment), had been prohibited from setting aside procurement contracts for award in labor surplus areas (LSAs) in order to relieve economic dislocations. In 1981 a coalition of northeast and midwest congressmen succeeded in having the Defense Logistics Agency (DLA) test a modification to the Maybank Amendment and measure the local employment effects of increasing DLA contract awards in LSAs. To assure reasonably accurate predictions of employment impacts due to the DLA Maybank Test, the U.S. Army Corps of Engineers Construction Engineering Research Laboratory developed a computer-assisted regional economic impact model (called the DLA Employment Impact System) to assist DLA with their congressional requirement.

SOURCE SELECTION

"The Make or Buy Decision—Its Nature and Impact" by John G. Beverly, Frank J. Bonello, James Daschbach, and William I. Davisson

There is no contractor at this time, in this nation, who can fabricate all the components needed for a major weapons system and deliver it in the time required and within cost limits. Therefore, the prime contractor must subcontract out certain of the components and parts needed for the system assembly. How do contractors make this division regarding the components and parts to be made vs. those to be bought? This paper reviews the background for this area providing the theory and the practices as found during a recent study for the Air Force Business Research Management Center.

"Selection of Multiple Sources in Weapon Systems Acquisition" by Commander James W. Hargrove, Jr., USN

Discussion of source selection and evaluation techniques usually focuses on selection of a single source to fulfill the government's weapon systems acquisition requirements. There are numerous instances when selection of multiple sources is an objective. The additional requirement to select multiple sources can greatly complicate the source selection

process. Two major source selections conducted by the Naval Sea Systems Command for the Fast Logistic Ship SL-7 conversion (TAKX) program illustrates techniques for selection of multiple sources in a highly complex situation. This paper discusses the significantly different procedures used in these two programs and identifies lessons learned.

"The SCORE Technique: An Analytical Approach for Assessing the Results of Manufacturing Reviews" by Raymond S. Lieber and Lieutenant Colonel Malcolm C. Edelblute, USAF

Since the early 1970s, the techniques for conducting manufacturing assessments have improved as the "lessons-learned" from each new team were passed on to the next. However, one area of the manufacturing assessment process, the scoring, has remained relatively unchanged over the years. This paper presents a fresh approach to the scoring process. The process outlined in this paper was first developed and used on the Next Generation Trainer Program. Since then, it has been applied successfully to other Aeronautical Systems Division manufacturing reviews both in Europe and the United States.

We Stand Corrected

Dear Sir:

The article "Defense Acquisition Management Organization" in your September-October 1983 issue incorrectly describes the U.S. Marine Corps Organizational Elements.

On page S-8, the Training Department is headed by a Deputy Chief of Staff.

On page S-9, "Director, Training Division" is incorrect; it should be "Deputy Chief of Staff for Training."

We enjoy your publication for its informative articles and look forward to receiving each issue.

Robert C. Lewis
Lieutenant Colonel, USMC
Headquarters United States Marine Corps

Slaying the Instability Giant

(Continued from page 32)

on the more important programs. Here again accountability is a factor. By leaving the marginal programs in the budget, the decision-maker forfeits his accountability to the next level above—and so it goes through the services and to OSD. Can Mr. Thayer implement his promise to wield a keen knife? More importantly, will his message spread down through the ranks where such decisions could be made more effectively? Who will step forward and be our David? Can a sharp, skilled knife cut to the heart of the Goliath of program instability? Many would-be Davids have tried before and failed; will it be different this time? Perhaps if there were a little of David in all of us in the acquisition business, who knows what might result?

Wrap-up

In the foregoing discussion, I have attempted to take a different approach in looking at the most serious problem of program instability. No startling new revelations were made—nor expected. Though I have noted many individual elements of instability, I have by no means provided a complete list. Some have been resolved or are of relative insignificance, others are being addressed now, and still others are not even fully understood yet. There are no easy solutions for many of them. I am not confident that my rather simplistic suggestions add anything to the existing body of knowledge, but I raise my concerns to join those of many others.

Program instability will not just go away. It is worsening and is critically hampering our ability to develop needed weapon systems on schedule, on cost, and with required technical performance. The problem cannot be studied to death, though we've tried. Nothing short of prompt, bold, and decisive action by all involved will save us from ourselves and bring program stability. ■

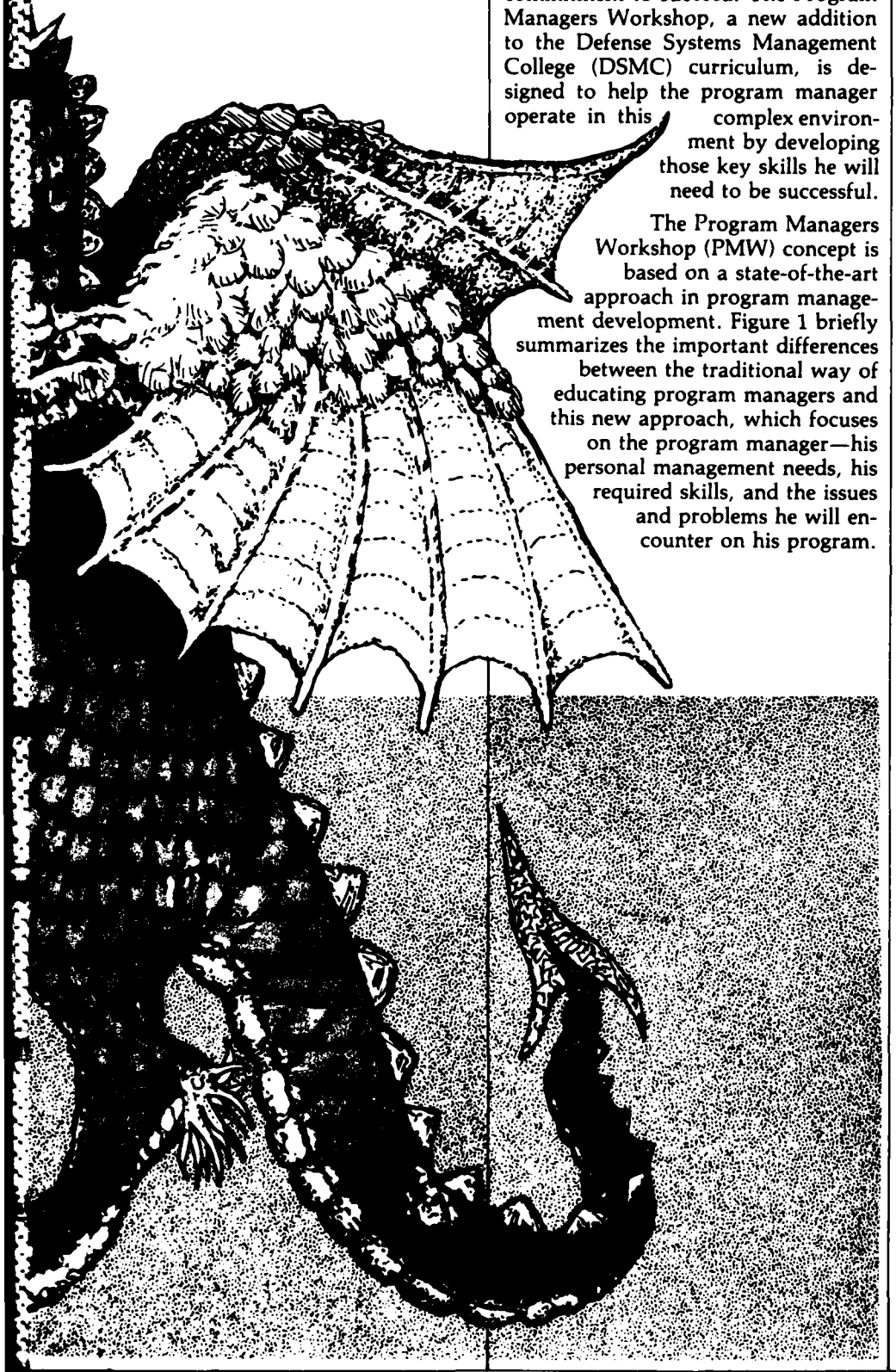
Program instability will not just go away. The problem cannot be studied to death, though we've tried.

Notes

1. Army Procurement Research Office, *Program Instability Survey*, undated.
2. Colonel G. Dana Brabson, USAF, "Can We Afford the DOD Acquisition Improvement Actions," *Concepts*, Winter 1982, p. 53.
3. *Ibid.*, p. 51.
4. Norman R. Augustine, "Augustine's Laws and Major System Development Programs," *Defense System Management Review*, Spring 1979, p. 57.
5. Colonel G. Dana Brabson, USAF, "Department of Defense Acquisition Improvement Program," *Concepts*, Autumn 1981, p. 65.
6. DUSDRE(AM), Memorandum for USDRE, Subject: Report of Acquisition Improvement Steering Group, June 29, 1982, p. 16.
7. Paul Thayer, "DepSecDef Thayer Comments on System Acquisition from a New Perspective," *Program Manager*, March-April 1983, p. 2.
8. Norman R. Augustine, "Augustine's Laws and Major Systems Development Programs (Continued), *Concepts*, Winter 1982, pp. 64–65.
9. Brabson, "Department of Defense Acquisition Improvement Program," p. 66.
10. W. M. Allen, "Should Cost/Will Cost/Must Cost: A Theory on the Cause of Cost Growth," U.S. Army SAFEGUARD System Office, Arlington, Va., June 1972, p. 12.
11. Augustine, Winter 1982, p. 66.
12. Eric Ludvigsen, "Defense Budget Shows 1984 Will Not Be The 'Year of Mars,' " *Army*, April 1983, p. 12.
13. DUSDRE(AM), p. 1.
14. Thayer, p. 3.

The Program Managers Workshop

Lieutenant Colonel Ray D. Spinosa, USA



The challenge of program management has never been greater. The program manager must deal with an increasingly complex environment demanding special, unique skills and the commitment to succeed. The Program Managers Workshop, a new addition to the Defense Systems Management College (DSMC) curriculum, is designed to help the program manager operate in this complex environment by developing those key skills he will need to be successful.

The Program Managers Workshop (PMW) concept is based on a state-of-the-art approach in program management development. Figure 1 briefly summarizes the important differences between the traditional way of educating program managers and this new approach, which focuses on the program manager—his personal management needs, his required skills, and the issues and problems he will encounter on his program.

The foundation of the workshop is *performance baselining*. Performance baselining is a process to determine what skills should be emphasized in the workshop. The process incorporates the current performance objectives of field offices with service and OSD policy to determine what skills are needed. Then, DSMC develops the appropriate educational techniques to ensure that each participant can apply those skills in his program. These techniques include seminars, case studies, experiential workshops, consultations, computer simulations, and new approaches such as on-line simulation. This simulation provides the opportunity to "shadow" a selected PM during a major decision cycle to share the uncertainty of the environment, in real time. We will rely heavily on experienced program managers to complement the participant's perspective of this complex environment, as it is today, jointly seeking solutions to participant concerns with matters relevant to each program. The focus on current service concerns will be discussed in evening seminars with each of the Joint Logistics Commanders. This important seminar series will provide that critical service perspective so necessary to be successful.

To achieve these objectives, the Program Managers Workshop is conducted in three parts: the intern, on-campus, and reunion phases (Figure 2).

Phase I

Phase I, internship, begins 3 months prior to course attendance (Phase II) with service and agency participant selection and nomination. DSMC mails each participant a pre-assignment package of performance-based skills diagnostics and managerial diagnostics to complete and return. We evaluate these diagnostics to assess the personal learning needs of each nominee and to develop special electives or tutorial sessions for Phase II. These evaluations guide the development of an individually tailored read-ahead package of articles, notes, and readings. This package should be read prior to Phase II.

■ *Lieutenant Colonel Spinosa is the PMW Course Director in the School of Systems Acquisition Education at DSMC.* ■

Figure 1.
The Important Differences In Program Manager Development

The Old Approach	The New Approach
Limited Control Over Who Attends	Specific Selectees
Generalized Curriculum	Specific Performance Based Curriculum-Need Adjusted
Limited or No Competency Assessment	Performance Based Competency Assessment
"All-Offerings" Package	Specific Package
Policy Indoctrination Emphasis	"Best Practices" Orientation
Graduates Have No Target Job	Graduates Have Target Jobs-Self Awareness-Self Motivation
Vertical Design	Longitudinal Design
No Support Networks	Development of Support Networks
Textbook Issues	Deals With Reality
Immersion On Arrival	Prior Assessment and Preparation

During this same period, each participant is required to develop relevant issues on his future program. These issues are developed and refined during visits to his gaining PMO, service staff, developmental staff, and to the contractor(s) supporting that program. These visits are intended to develop a meaningful set of issues to discuss during the on-campus phase. Each participant will be required to have these program issues identified so that he will refine and resolve them on-campus. All work on-campus will be related to and reflected in the resolution of these issues. At the conclusion of the on-campus phase each participant will be required to develop an assessment of his program, describing the important issues, alternatives for resolution of each issue, and his preferred courses of action to be implemented when he returns to his job.

Phase II

Phase II, the on-campus phase, lasts 5 weeks. This phase includes numerous modules in skill building, skill reinforcement, experiential learning, discussions with guest program managers, and numerous workshops to tie these learning experiences to personal program issues. Five themes that are key to program success are threaded through the course design. These key themes and their supporting modules are shown in Figure 3. The emphasis of each module is "how to." Dealing from a broad experience base, each module will focus on those aspects that are key to the program manager's success and survival on the job.

Another aspect of the on-campus phase is the development of a personal support network. Attendees will be working with many talented, experienced managers and functional experts during their stay at DSMC: We en-

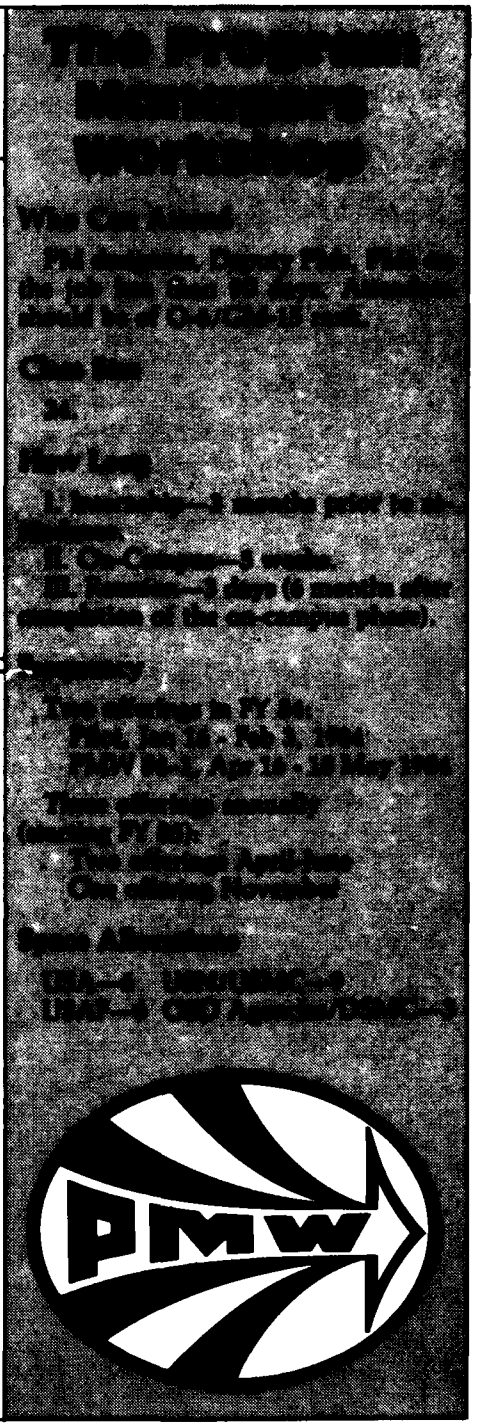


Figure 2.
Three Phases of the Program Managers Workshop

INTERN PHASE	ON-CAMPUS	REUNION
Selection	Acquisition Strategy	Voluntary Call for Issues
Performance Based Diagnostics	Cost Control	DSMC Consultation
Individually Tailored Read-Ahead Package	Network Management	Support Network Development
PMO/Industry Visit	Risk Management	
	Government - Industry Relationship	

Figure 3.
The Focus on Performance

ACQUISITION STRATEGY
- Congressional Trends
- Defense Industry Trends
- Program Trends
- USDR&E Issues
- DSARC Process
- PPBS Process
- Managing for Success
- Guest PMs
- Guest CEOs
- Workshops

RISK MANAGEMENT
- Uncertainty
- Cost
- Time/Schedule
- WBS Control
- TRACE
- Engineering
- Testing-Trouble Shooting
- ILS Planning
- Visiting PMs
- Workshops

NETWORK MANAGEMENT
- Team Building
- Matrix Management
- Consensus Building
- Media
- Congressional Testimony
- Information Management
- Problem Analysis
- Decision Analysis
- Situation Appraisal
- Guest PMs
- Workshops

COST CONTROL
- Cost Estimating
- Budgeting
- Contracts
- Source Selection
- Competition/Break-Out
- Business Strategy
- Multi Year
- DTC
- Should Cost
- VECP
- Baselining
- Guest PMs
- Faculty Consultations
- Workshops

GOVERNMENT-INDUSTRY RELATIONSHIP
- Profit/Loss
- Cost/Overhead
- Capital/ROI
- Industry Perspectives
- Role of Industry
- Competition
- Controlling Costs
- Productivity
- Visit Corp. Staff
- Visiting CEOs
- Field Trip

courage each participant to cultivate those associations that may provide him long-term support. We will emphasize support network development. We consider DSMC to be an important part of that network.

Phase III

Completion of the on-campus phase does not mean the PMW is over—not yet. We will participate in an applications workshop at a reunion (Phase III) 6 months after the completion of Phase II. This 3-day workshop will provide an opportunity for all to compare recent experiences, to reinforce the learning process, and to exercise their DSMC support network. This workshop will provide a sounding board for ideas.

The PMW is an ambitious undertaking. Its success depends on advanced educational techniques, service implementation, and each participant's personal motivation and commitment to succeed. DSMC feels the PMW is needed for the '80s—the PMW staff commitment is to you, the current and future program manager.■

AF Cost Initiatives

(continued from page 4)

services represented here are equally concerned over cost control and are taking similar initiatives.

You also have to believe in what you are doing. If you don't understand the importance of your job to our national security or don't have intense personal pride in your work, you might as well quit. Give up the idea of being a leader, a program manager, and get yourself a less demanding job.

The tools are in place. However, whether or not we are successful in these efforts will depend less on the tools than on the people who use them—the people who know the basics of good management and who have the mental toughness to apply them unwaveringly.

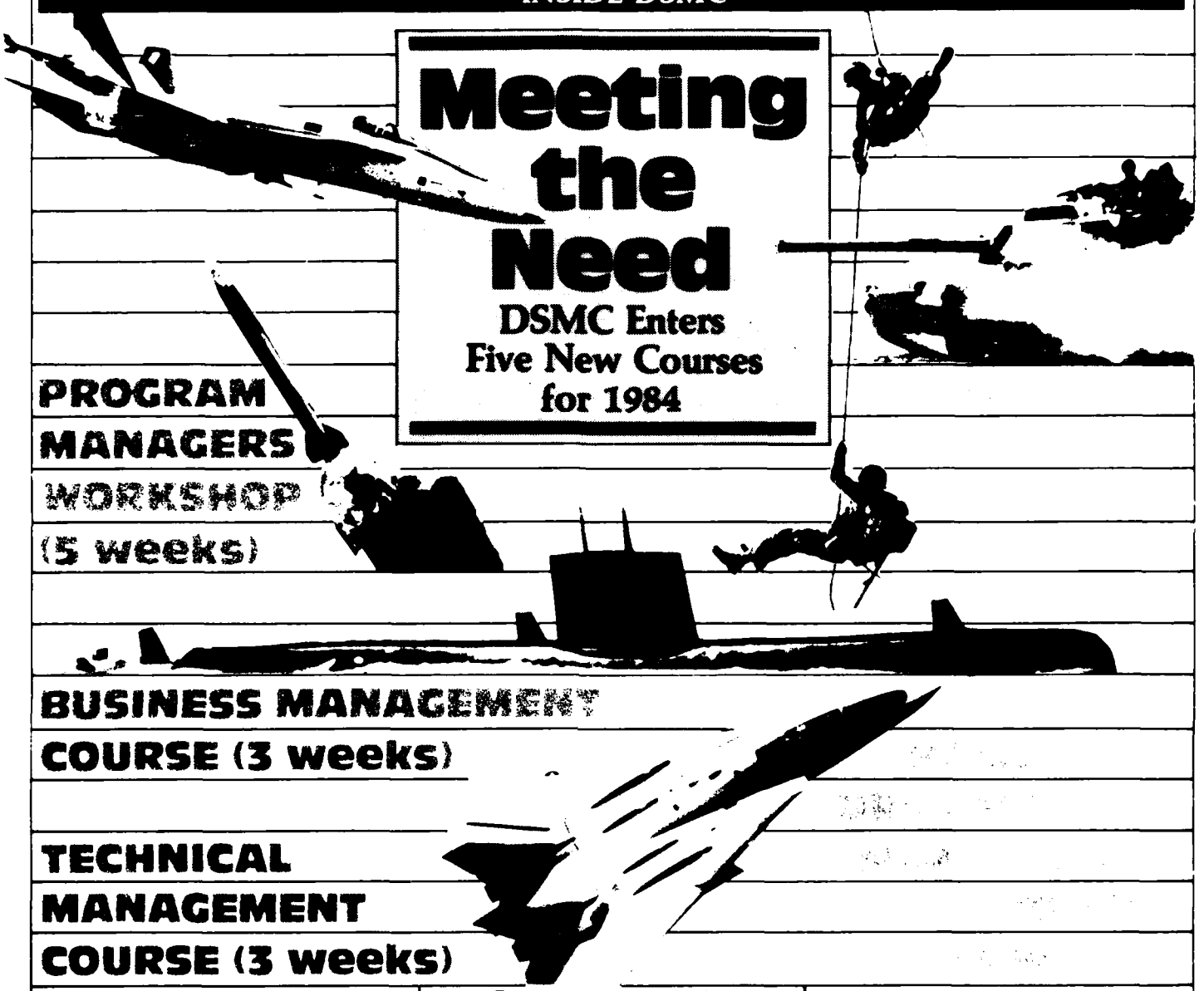
In today's acquisition community, the requirement for effective leadership from program managers is greater than ever before, whether you are a program manager for a major program, a supervisor for only a handful of people, or not supervising anyone but yourself—you must still be a leader.

You have direct responsibility for an important job to be done—setting the direction, getting coordination, fostering teamwork, and staying out on the point all the way. That's a leadership role by anybody's definition.

We all know that as our defense capabilities grow more complex, acquisition becomes more challenging and our requirement increases—for people who are willing and able to take charge. And that's the first mark of a leader: You must be a "take-charge" person.

You also have to master the work at hand. Competence counts. So know your business, be professional. Be your own strongest critic, more critical of yourself than your boss, your colleagues, or your subordinates would ever be.

If we take these steps together, then we will have done our jobs. We will assure that our country can afford the military capabilities that underpin our future security. If we falter in these steps, we had better start lining up the pilots to fly that single airplane.■



Meeting the Need

DSMC Enters Five New Courses for 1984

PROGRAM MANAGERS WORKSHOP (5 weeks)

BUSINESS MANAGEMENT COURSE (3 weeks)

TECHNICAL MANAGEMENT COURSE (3 weeks)

Gregory T. Wierzbicki

DSMC will pilot five new courses in 1984, signaling the culmination of a major overhaul to its curriculum.

The curriculum transition, which began in 1982, was initiated as a result of the growing awareness within the DOD acquisition community that the vast complexity of today's programs has led to a heightened need for broadly skilled program managers with increasingly high levels of managerial sophistication. It is widely recognized that the ability of the PM to integrate across the multiple functional disciplines of his program has become a necessary condition for program success.

Whereas this need for a comprehensive and integrated approach to program management has long been the hallmark of the 20-week Program Management Course (PMC), only a small fraction of the thousands of DOD acquisition managers and staff have had (or, it is anticipated, will have) an opportunity to attend this course. Until now, the options open to DSMC's student customers have been to enroll in the PMC for 20 weeks to cover the "waterfront" of DOD systems acquisition management, or to choose from among numerous highly specialized 1-week functional short courses, or to attend several overview/refresher courses ranging from 2 to 4 weeks in length.

From the customer's viewpoint the PMC has been the obvious ideal choice for mid-career civilians and officers. Yet even with an increasing PMC enrollment, from 60 students in the mid-1970s to more than 200 today, the fraction of managers who need the PMC and actually have the opportunity to attend continues to be much too small. Further, facility and staffing constraints, as well as academic considerations regarding the number of students that should be packed into a classroom, preclude the eventuality of much continued growth to PMC enrollment over the next several years.

In view of this, the DSMC student customer of the recent past, who for

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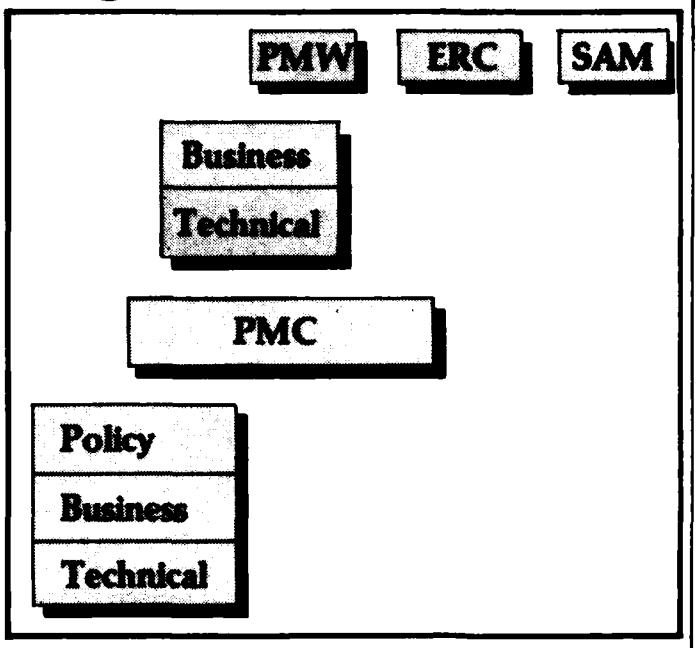
Figure 1. New Curriculum Configuration



whatever reason was not afforded the opportunity to attend the PMC, widely sought substitute methods for satisfying his needs. Substitutes frequently took the form of one or more specialty short courses taken perhaps in conjunction with an overview/refresher course. This stop-gap approach proved inadequate. It led inevitably to the incomplete development of the manager's abilities to integrate across functional specialities of program management, as well as the sacrifice of his comprehensive understanding of systems acquisition management.

The point that has emerged is that the manager who selected a substitute from among the alternatives to the PMC left DSMC with, at best, limited abilities to integrate or comprehend the complexities of program management. The cost impact to his program may have been enormous, since, if the manager was to acquire the needed abilities, he must have done so *on the job*. His ability to acquire these skills through on-the-job training was not in question; rather, the concern was with the wisdom of *relying* on OJT for their development.

It became evident that there was a segment of the DSMC student clientele whose educational needs were not being satisfied.

Enter Package Courses and Workshops

Three broad functional package courses have been created for functional specialists, analysts, and promising managers who need to improve their ability to interrelate key disciplines which constitute broad functional areas of program management. For instance, the Business Management Course will concentrate on the integration of funds management, contractor financial management, contract performance measurement, and contract management—all within the broad functional umbrella of "business management." The Technical Management Course will serve as the vehicle for the student to integrate test and evaluation management, manufacturing management, systems engineering, logistics support, and software management. Similarly, the Policy and Organization Management Course will attend to the development of the student's ability to integrate scheduling and analytical methods of project management, human resource management, communications, executive branch policy and strategy, and legislative liaison.

Two advanced functional workshops have been developed for mid- to senior-level functional managers who may gain immeasurable benefit by drawing on the experiences of their well-heeled peers. The Business Managers Advanced Workshop was the first course of this type, and has proved immensely successful since its introduction in 1982. The Technical Managers Advanced Workshop will make its debut in 1984. Its goal is to refine the abilities of experienced technical managers so they may improve the balance among performance, supportability, testability, and producibility as they design their systems within cost and schedule constraints.

The Program Managers Workshop is designed to meet the needs of designated program managers and deputy program managers. Attendance at this workshop should precede the student's assumption of project duties. This course will broaden and enrich the experiences the designee brings to his assignment and will seek to develop his ability to "hit the ground running." Much of the workshop will be tailored to the needs of individual students in order to improve their chances for success during the first 12 months on the job. (See "Program Manager Development: A State-of-the-Art Approach" in this issue.)

DSMC's New Curriculum Configuration

As plans were prepared to develop the courses just described, it was apparent that subcourse commonality and modularity would be essential if we were to make the best use of the College resources. It was also seen as necessary to examine each course in the College's product line and assess its contribution to the tri-service system acquisition community DSMC is chartered to serve, and its costs relative to alternative choices. The curriculum configuration that emerged is depicted in Figure 1. Schedules and descriptions for all courses offered in 1984 are available through the DSMC Registrar office (703-664-3120 or Autovon 354-3120).

The transition to our new curriculum configuration, when completed during 1984, will have taken 2 years to execute. It has been extensively coordinated with our Policy Guidance Council, the DSMC Board of Visitors, and the Joint Logistics Commanders. We hope you will find it better suits your needs and that you are able to take advantage of the new developmental opportunities it affords. We are looking forward to seeing each of you at DSMC.■

Program Management and the Legislative Branch:

A Day on Capitol Hill

Owen Gadeken

One of the highlights of each Program Management Course (PMC) at DSMC is a 1-day visit to Capitol Hill so that the students can personally experience the role of the legislative branch in shaping defense system acquisition programs. Although the students receive classroom instruction on the congressional budget process, the insights they gain on the Hill bring home the real importance of personalities, politics, and parliamentary procedures in this process.

The Trip

The PMC 83-2 trip was unique in several ways. For the first time, the trip began with a catered breakfast in the Rayburn House Office Building, where the students were addressed by Representatives Dave McCurdy of Oklahoma, Sam Stratton of New York, Newt Ginrich of Georgia, and Beverly Byron of Maryland. Kim Wincup from the House Armed Services Committee staff and Captain Pete Cressy, Chief of the Navy Liaison Office, rounded out the morning program.

Another first for the trip was doubling the student elective time to afford maximum opportunity to observe House and Senate floor activities, committee hearings, and allow individual time with elected members and staffers. Fortunately, both armed services committees and several other standing committees of both houses were meeting in open session. Judging from students' comments, the most interesting hearing was the House Armed Services Committee morning session convened to review several programming requests, including one to cover a funding shortfall that left the Army temporarily unable to pay its military personnel for the last 4 days of fiscal year 1983. Most students also visited one of

the two galleries in the Capitol to observe House or Senate floor activity. They found the floors sparsely attended by elected members and the activity relatively dull, unless a roll call was in progress, bringing all members to the floor to cast their votes.

Students were provided in advance with Capitol Directories and encouraged to make appointments with their elected representatives during their elective time. Many took advantage of this opportunity with interesting results. One student commented, "My congressman was not on any defense-related committees and had little information on defense programs. He was genuinely interested in what I knew and how I felt about major programs being debated in the current defense budget. He took notes as I talked." Another student observed, "My congressman put me on the defensive from the moment I sat down. He's a real street fighter! He asked me why I had registered with the other party in the last election. He had actually checked the record before my visit!"

The trip concluded in the Russell Senate Office Building with speeches by Wayne Arny and Jim Roche of the Senate Armed Services Committee staff and Captain Tom Lynch, Chief of the Navy Senate Liaison Office. The featured speaker, Senator Warren Rudman of New Hampshire, barely made this session due to a delayed Investigations Subcommittee hearing he was chairing, but he did arrive at the end of the day to give the final address.

Many students returned from the trip awed and frustrated at the true power of our senators, representatives, and congressional staff to control the purse strings of DOD programs. Our students also sensed that from their future positions in program offices, they may have little or no opportunity to influence these powerful representatives and staffers. Further, they observed that their service and DOD executives that testify before the defense-related committees often have limited knowledge of the large number of programs they must defend. The most common frustration felt by the students was, "How can we support

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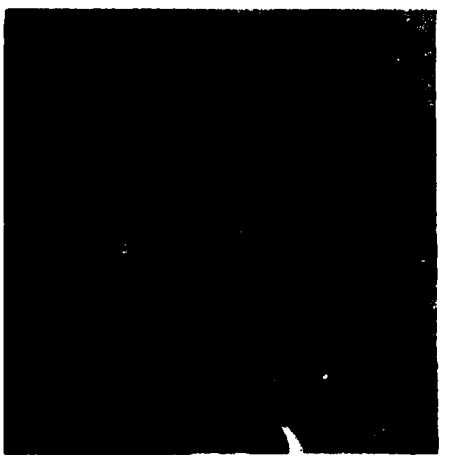
our programs in the congressional budget process?"

Recap Sessions: Lessons Learned

As a wrap-up to the Capitol Hill experience, class sessions were held back at DSMC to focus some of the students' perceptions on what they can do in the program office environment to ensure a more effective interface with Congress. Most students feel they must know the system they are facing—the authorization and appropriation processes, steps in each committee review cycle, and the personalities and motivations of key representatives and staff members who must influence the process. They conclude that most of the congressional budget process must be accepted as outside their purview. But, knowledge of the system can reveal windows of opportunity for DOD executives and even program office personnel to interact with Congress.

Since program office personnel, and even the program manager, rarely meet in person with defense-related committee members or staffers, it becomes more important to build a consensus for the program within the service and OSD, considering these organizations as an extension of the program management team. The program manager and his key deputies should take every opportunity to get out and brief their program and meet the members of this "extended team" so that, when services and DOD executives testify before these committees and talk individually with the members and staffers, they will be familiar with



The Capitol Hill field trip for PMC 83-2 began with a breakfast during which the students heard presentations by Representatives Beverly B. Byron, D-Md. (above), Newt Gingrich, R-Ga. (top right), Samuel Stratton, D-N.Y. (right center), and Dave McCurdy, D-Okla. (bottom right). The students also heard from Kim Wincup, a staff member of the House Armed Services Committee.

the program's basic features and core issues. Not everyone in the service or OSD can be expected to become a program advocate, but the more familiar key people are with the program, the more likely the program will be to receive knowledgeable, consistent, and favorable DOD testimony on Capitol Hill.

Another important part of this extended program management team for ensuring an effective interface with the legislative branch is the service headquarters focal point for the program—the Department of the Army Systems Coordinator (DASC), the Navy Program Coordinator (PC), and the Air Force Program Element Monitor (PEM). They represent the program office in both the OSD and congressional arenas. They frequently attend committee hearings and talk with the professional committee staff on specific program issues.

The service legislative liaison organizations, both in the Pentagon and on the Hill itself, are important members of the program management team. Their contacts and knowledge of day-to-day congressional activities can be invaluable in providing factual information and correcting misinformation during any part of the budget cycle.

Last, and not to be overlooked, are the contractors and their legislative marketing offices in Washington, D.C.

In the afternoon session, the students were addressed by Senator Warren Rudman, R-N.H. (above), and two Senate Armed Services Committee Staffers, Wayne Arny and Jim Rocke.

While each contractor is free to lobby for his own programs, the program manager should ensure coordination among all participants on his program, both in government and industry. They should all work from the same basic facts and overall program plan. This will help alleviate a frequent congressional complaint that they are bombarded with conflicting information on the same programs.

Finally, the program manager and program office originate and control the most vital element that feeds the entire DOD and congressional budget review process—information. While program office personnel don't often speak directly to committee members or staffers, they do speak indirectly through the program information they provide. Time spent in putting this information into a direct but concise story to justify the program will have significant payoff during later reviews. For that matter, well-developed program information can serve to educate OSD and congressional participants throughout the budget review process. Also important is some advance thinking and trade-off analysis in preparation for the formal flurry of "what if" exercises that inevitably occur in the budget cycle. It's much easier to respond to a phone call from headquarters with a short suspense to rebaseline your program if you've done some advanced thinking on the general problem and considered the major effects of several alternatives.

Summary

To some students, the Capitol Hill trip was a chance to leave the classroom behind for a day and be entertained by the political process. But to most of the class, the day was an opportunity to see the congressional budget process as it really occurs: one-on-one in the hallways and offices, in small groups in committee hearings, and, finally, *en masse* on the floors of the House and Senate. For many students, the day's brief glimpse of congressional activity is but the first round in a long-term relationship with Congress on defense acquisition programs.■

Strategies for Dealing with Defense Budget Turbulence

(continued from page 42)

based on long-term affordability and not on reaction to budget turbulence.

The current strategies were evaluated on the basis of mission effectiveness over time and impact of strategies on the industrial mobilization base. Of the remaining four politically viable strategies, it was determined that there is little quantitative or subjective basis for choice independent of having detailed, program-specific information. For example, with exponential program cost-quantity relationships, extra protection for some programs may be a cost-beneficial strategy. In other cases, when systems are being procured close to their economical production rates, it may not be.

The current strategies of "provision for extra protection for top-priority programs" and "stretching-out/speeding-up other programs" should be continued. The mix of programs should be achieved by allowing for the optimum combination of systems for the expected long-term level of future budgets. The combination of strategies chosen should be based on careful analysis of the costs peculiar to each program on industrial mobilization requirements and on other program-specific judgmental factors. The economic gain created by giving extra protection to stable programs should be explicitly estimated and included in the cost analysis.

Choices between extra protection of some programs (partial fencing) and distribution of turbulence among most or all other programs must be made on a case-by-case basis.

Recommended future studies for improvements to the current processes include:

—Creation of a second independent inflation projection and use of the higher projection in the PPBS;
—Preparation of turbulence budgets for program managers; and
—Provision of turbulence contract incentives.

Where to Obtain Copies of the Report

Copies of the report may be obtained from the Defense Technical Information Center, Defense Logistics Agency, Cameron Station, Alexandria, Va. 22314, or by calling (202) 274-6847 or Autovon 284-6847. There is a charge for copies sent to contractors. Ask for ADA 134 459.■

PEOPLE ON THE MOVE

Barreca

Bramblett

Joanne L. Barreca has joined the Policy and Organization Management Department, School of Systems Acquisition Education, as a Professor of Acquisition Management. Her previous assignment was at ODCSRDA, Munitions Division, Pentagon. She is a graduate of PMC 83-1. Ms. Barreca holds a B.A. degree in anthropology from the University of Arizona, and an M.P.A. degree in political science from the University of Oklahoma.

Lieutenant Colonel John R. Bramblett, USA, is the Special Assistant for the Contractual Program, Department of Research and Information. His last assignment was at the Department of Army Headquarters, where he was responsible for developing Army materiel acquisition policy, Office of the Deputy Chief of Staff for Research, Development, and Acquisition. Lieutenant Colonel Bramblett received a B.S. degree in mathematics from Bowling Green State University, and an M.S.I.E. degree from the Georgia Institute of Technology.

Caver

Gibson

Troy V. Caver has joined the Technical Management Department, School of Systems Acquisition Education, as a Professor of Engineering Management. He came to DSMC from Singer Kearfott, an aerospace division of Singer Corporation. Mr. Carver was a lieutenant colonel in the Army before retiring in August 1982. He holds a B.S.E. degree in mathematics and science from Henderson College, an M.S.E.E. degree from the University of Texas at El Paso, and an M.B.A. degree in strategic planning from Marymount College. He is a graduate of PMC 77-1.

Major Eugene T. Gibson, USAF, is an Instructor of Systems Acquisition Management, Acquisition Management Laboratory, School of Systems Acquisition Education. He came to DSMC from the Air Command and Staff College, Maxwell AFB, Ala., and before that was a program manager in the Aeronautical Systems Division, Wright-Patterson AFB, Ohio. Major Gibson received a B.S. degree in mechanical engineering from Christian Brothers College, Memphis, and an M.B.A. degree from the University of Wyoming.

Hunter

Nieroski

Dr. William N. Hunter has been selected by the Office of Management and Budget for the newly created Office of Federal Procurement Policy Chair, Executive Institute, Office of the Commandant. His last assignment was Director of the Federal Acquisition Institute from 1979 to 1983. Dr. Hunter holds a B.S. degree in engineering from Northeastern University, an M.B.A. degree in finance from the University of Hartford, an M.S. degree in management from the Naval Postgraduate School, and a Ph.D. degree in management sciences from California Western University.

John S. Nieroski holds the newly created Resource and Cost Analysis Chair, Executive Institute, Office of the Commandant. The chair is sponsored by the Chief of Naval Operations. Before joining DSMC, Mr. Nieroski was the SECNAV/CNO Advisor for Resources Analysis, Pentagon. He holds a B.S. degree in mechanical engineering from the University of Connecticut, and an M.S. degree in mechanical engineering from the California Institute of Technology.

1984 Catalog Available

The 1984 Defense Systems Management College Catalog is available for distribution throughout the acquisition community. The Catalog describes each course offered by the College and the prerequisites for enrollment. If you haven't received a copy of the Catalog, or if you would like a copy for a friend or associate, write:

DSMC Catalog
Defense Systems Management College
Attn: DAS-A
Fort Belvoir, Va. 22060

Stewart

Varley

Perry C. Stewart has accepted the Army Chair, Executive Institute, Office of the Commandant. His last assignment was at the U.S. Army Logistics Center, Fort Lee, Va., where he was the Scientific Advisor for Logistics Combat Development. His responsibilities included directing completion of the Combat Service Support Mission Area Analysis and reorienting the Center's operations research capability in the evaluation of emerging Army logistics concepts and doctrine. Mr. Stewart received a B.S. degree in mathematics from Utah State University, and an M.S. degree in logistics management and operations research from the Air Force Institute of Technology.

Dr. Thomas C. Varley is the Executive Director, Navy Office for Acquisition Research (NOAR), which is colocated with DSMC. NOAR is an office of the Chief of Naval Material with responsibilities for conducting applied research directed toward improving the effectiveness and efficiency of the Navy acquisition process. He served with the Department of the Navy since 1962, mostly with the Office of Naval Research, where his primary areas of concern centered around the disciplines of operations research. Dr. Varley holds B.A. and M.A. degrees in business and economics and a D.B.A. degree, all from George Washington University.

Other Staff Additions:

Debbie Johnson, Administrative and Personnel Service Directorate.

Carolyn Prentice, transferred from the School of Systems Acquisition Education to the new PMSS Directorate, Department of Research and Information, to be the Research Assistant.

IC1 Douglas Evilsizer, USN, to the Academic Support Directorate from the USS *South Carolina* (CGN-37), Norfolk, Va.

Clarence Collins, Maintenance Engineer, Academic Support Directorate.

Staff Losses:

Lieutenant Colonel Stephen R. Schwam, USAF, School of Systems Acquisition Education, retired.

Samuel S. Staley III, School of Systems Acquisition Education, to be Joint Cruise Missile Program Manager for Logistics, Arlington, Va.

Gladys Long, School of Systems Acquisition Education, resigned.

YN1 Jim Gerth, USN, Administrative and Personnel Service Directorate, reassigned to Puerto Rico.

Lieutenant Jenel M. Turner, USN, SHORSTAMPS Instructor, Policy and Organization Management Department, to the Office of the Chief of Naval Operations, Navy Annex.

Acker Elected Chairman

David D. Acker, Professor of Engineering Management and member of the research staff of DSMC, was elected chairman of the prestigious Gantt Medal Board of Award at a November 10 meeting in New York City. This board comprises five representatives of the American Management Associations (AMA) and five representatives of the American Society of Mechanical Engineers (ASME). These board members are executives from business, industry, and academia.

The Gantt Medal, established in 1929, is awarded annually "for distinguished achievement in management as a service to the community." It commemorates the achievements of Henry Lawrence Gantt, a distinguished management engineer, industrial leader, and humanitarian. The Medal recognizes individuals whose personal endeavors and managerial leadership have rendered conspicuous service to the community at large. It is awarded annually, except in those years in which it is judged that no nominee fully meets the award's high standards.

The Gantt medal is bestowed upon individuals who have made a genuine contribution to management and mankind from any field—industrial, financial, professional, educational, and governmental. Important qualities of a potential recipient of the Medal are:

—Significant economic and social advancement;
—Imaginative innovation or refinement of management concepts;
—Unique leadership to inspire others; and
—Evidence of major contributions in service to the community.

The Gantt Medal has been bestowed upon industrial and business executives, academicians, and consultants who have pioneered, advanced, and popularized the profession of management. Gantt Medal recipients are leaders who have demonstrated an understanding of management as something beyond the pursuit of organizational profits or individual aggrandizement. Past recipients of the medal include David Packard, Chairman, Hewlett-Packard Co., and Dr. Lillian Gilbreth, a pioneer in time-and-motion studies. In 1982, Walter A. Fallon, Chairman of the Board, Eastman Kodak Company, was the recipient.

As chairman of the Gantt Medal Board, Professor Acker will make the presentation to the 1983 medal recipient. The presentation will take place in March 1984 at the Westin Hotel in Boston. More than 1,000 people are expected to attend the presentation luncheon, which will be held in conjunction with the AMA annual Human Resources Conference.

DSMC Alumni Association Formed

More than 60 Defense Systems Management College (DSMC) graduates, representing virtually every Program Management Course (PMC) class, met at the College on October 20 and established a DSMC Alumni Association. Brigadier General Benjamin J. Pellegrini, DSMC Commandant, welcomed the group and expressed his support for the organization. Support was also expressed by many PMC graduates who were unable to attend the meeting.

The Association will provide a forum for advancing the professional growth of the defense acquisition community, and will also provide a resource of experienced acquisition management professionals available to contribute to the growth and effectiveness of DSMC.

Two major areas of business were completed, the approval of the constitution and the election of officers. The following officers were elected to serve through June 1984:

Joanne Barreca (DOD civilian)—President
Fred Wynn (industry)—Vice President, Operations
Lieutenant Commander William Montgomery, USN—Vice President, Membership/Programs
Major Paul McFarland, USA —Secretary
Kenneth Blum (industry)—Treasurer

The following Board of Directors members were elected and will chair the committees indicated:

Major Thomas Christensen, USAF —History/Roster
John Ferney (industry)—Publications
Robert Puff (industry)—Audit
Commander Robert Springer, USN —Nominations/Elections
Otto Thamasette (industry)—Constitution/Operating Procedures
Chuck Tringali (industry)—Membership

Albert Hey (industry) has been appointed to chair the Publicity/Public Relations Committee.

The Alumni Association, in conjunction with DSMC, will conduct a symposium each June that will include discussions of changes in the DOD acquisition process as well as DSMC matters. The Board of Directors will meet each December and June. A quarterly newsletter is planned, and a membership roster will be published.

All graduates of DSMC are invited/encouraged to join and be active in the Alumni Association. Regular membership is open to graduates of the Program Management Course, as well as present and past faculty and professional staff members assigned to DSMC for at least 2 years. Individuals who have completed one or more short courses at DSMC or hold key defense acquisition program management positions are eligible for Associate Membership.

Annual dues are $5.00, and with an additional donation of $15.00 before the June symposium, a certificate of Charter Membership will be issued. To join, complete the application form and mail to:

Defense Systems Management College
Office of the Registrar (Alumni Section)
Fort Belvoir, Virginia 22060

DSMC Alumni Association Application

Name (last, first, m.i.)_____ Rank _____

Service/Agency/Company_____

PMC Class_____

Faculty/Staff Position and Years_____

DSMC Short Course Title and Date_____

Current Title/Position_____

Preferred Mailing Address_____

_____

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_____

Telephone (Home)_____ (Office)_____

Check enclosed, payable to DSMC Alumni Association:

- ☐ Regular Member ($5.00)
- ☐ Associate Member ($5.00)
- ☐ Charter Member ($15.00 additional)

Committees you are interested in:

- ☐ Membership
- ☐ Constitution/ Operating Procedures
- ☐ Symposium
- ☐ Publications
- ☐ Nominations/Elections
- ☐ Publicity/PR
- ☐ As Needed
- ☐ Other_____

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